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We have again to acknowledge the receipt of many kind words from Canadian correspondents. We can best respond to these by constant efforts to keep the "Canadian Supplement" up to a standard which will satisfy its friends.

We give considerable space in this "Supplement" to the meeting of the Canadian Mining Institute at Montreal. The meeting was a very successful one and a number of valuable papers were presented. Abstracts of some of these are given in the following pages, and others will be presented hereafter.

Dr. Robert Bell has been placed in charge of the Geological Survey of Canada in place of the late Dr. Dawson, and it is said that he will be appointed director. He has been assistant director for a number of years, and is well known, both by his work in the field and by the many valuable reports and papers which he has written.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials will only be published when so requested.
Letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

The Central Canada Chamber of Mines.

Sir: The first article in the February number of your "Canadian Supplement," purporting to be a series of resolutions passed by the council of the Canadian Mining Institute and signed by one B. T. A. Bell as secretary, demands some attention, lest your many readers might conclude the Central Canada Chamber of Mines as quite unworthy of public confidence, and that what might appear from its high-sounding Canadian title, as the principal miners' organization of the Dominion, found it necessary to issue a vigorous warning.

Canadian mining men of experience, who understand the whole situation, will indorse and confirm my statement that the warning, if any, is required the other way on. The Chamber of Mines is all right and doing an important work, carefully and in the public interest.

A council of sixteen members of the Canadian Mining Institute is appointed to transact business between the sessions. I am credibly informed that but four were present when the resolutions referred to were passed. No doubt the Chamber of Mines is quite able to take care of itself. I am not a member of it and write of my own free will. I am a miner and have a knowledge of what I write about.

The "British Columbia Review," published in London, England, says in its issue of February 19th: "The statements made form time to time by the Central Canada Chamber of Mines in regard to the great possibilities which the Western Ontario Gold-fields offer for the profitable investment of capital, are fully indorsed by Mr. F. H. Probert, of the Royal School of Mines. This engineer, who has made a careful investigation of the district, strongly recommends it to the attention of capitalists." Canadian.

Toronto, Ont., March 1, 1901.

(Without taking part in the dispute on either side, we are obliged to say that the Central Canada Chamber of Mines has been, to say the least, injudicious in the kind of literature it has distributed. We have received a number of slips or advance proofs from it, which were evidently written by persons who knew nothing of mining, and which, while seeking to advertise the district, did it in a way which would certainly cause distrust among mining men. We do not wish to question the motives of the managers of the Chamber, but they certainly need an editor badly. The gold-fields of Western Ontario need only to have the truth about them made public; injudicious and indiscriminate booming will do them more harm than good.—Editor E. & M. J.)

THE MINERAL PRODUCTION OF BRITISH COLUMBIA.

From Our Special Correspondent.

The returns of the mineral production of British Columbia for the year 1900 were submitted to the local legislature by the Provincial Minister of Mines on March 5th, and show that there was during the year an increase in the value of the output of the lode mines of the Province of $3,310,428, and a decrease in that of placer gold of $66,176; leaving a net increase in metallic minerals for the year of $3,244,252. There was also an increase of $1,013,238 in the value of coal and coke. No returns are yet available of the value of other non-metallic minerals, so those cannot now be taken into account. The foregoing figures, though, exhibit practically last year's net increase, which was $4,257,490, as shown in detail in the following table:

	1899.	1900.	Changes.
Placer gold	$1,344,900	$1,278,724	D. $66,176
Lode gold	2,857,573	3,461,067	I. 603,494
Silver	1,663,708	2,295,099	I. 631,391
Copper	1,351,453	1,615,289	I. 263,836
Lead	878,870	2,690,577	I. 1,811,707
Coal and coke	4,053,651	5,066,889	I. 1,013,238
Totals	$12,150,155	$16,407,645	I. $4,257,490

The total mineral production of the Province for all years up to and including the year 1900 is as follows:

Gold, placer	$62,584,443
Gold, lode	12,820,546
Silver	13,635,708
Lead	6,543,358
Copper	5,437,871
Coal and coke	49,426,700
Other minerals (approximate amount)	2,000,000
Total	$152,448,626

The number of tons of metallic ore mined in the Province in 1899 was 287,343, and in 1900, 554,796, the increase for last year having been 267,453 tons. The respective increases for 1900 over 1898 were: In quantity of metallic ore mined, 338,852 tons, and in value of metallic minerals, coal and coke, $5,652,284, the latter being an increase of more than 50 per cent.

THE MINERAL OUTPUT OF ONTARIO.

The Ontario Bureau of Mines has published the following statement of the values of the mineral production of the Province for the past year. The total value of the product was $9,242,044, compared with $8,416,083 in 1899, an increase of $826,006. There were 10,864 men employed with a wage bill of $3,364,401, or about one-third the total value of the output. The report again shows that it is in the plainer mineral products, such as petroleum and clay products, that the largest return lies, although the iron, nickel and copper industries are making great strides. The details are shown in the following table of values:

Product.	1899.	1900.	Changes.
Building stone, rubble, etc	$667,532	$650,342	D. $17,190
Cement, natural rock	117,039	99,994	D. 17,045
Cement, Portland	444,227	598,021	I. 153,794
Lime	535,000	544,000	I. 9,000
Drain tile	240,246	209,738	D. 30,508
Common brick	1,313,750	1,379,590	I. 65,840
Pressed brick and terra cotta	105,000	114,419	I. 9,419
Paving brick	42,550	26,950	D. 15,600
Sewer pipe	138,356	130,635	D. 7,721
Pottery	101,000	157,449	I. 56,449
Petroleum products	1,747,352	1,869,045	I. 121,693
Natural gas	440,904	392,823	D. 48,081
Carbide of calcium	74,680	60,300	D. 14,380
Salt	317,412	324,477	I. 7,065
Gypsum	16,512	18,050	I. 1,538
Graphite	16,179	27,030	I. 10,851
Talc	500	5,000	I. 4,500
Mica	38,000	31,550	D. 6,450
Corundum	.....	6,000	I. 6,000
Felspar	.....	5,000	I. 5,000
Iron ore	30,951	111,805	I. 80,854
Pig iron	808,157	936,066	I. 127,909
Steel	.....	46,380	I. 46,380
Nickel	526,104	756,626	I. 143,444
Copper	176,237	319,681	D. 23,500
Zinc ore	24,000	500	I. 17,883
Arsenic	4,842	22,725	D. 126,117
Gold	423,978	297,861	I. 30,792
Silver	65,575	96,367	I. .....
Total	$8,416,083	$9,242,044	I. $825,961

The increase in total values last year was 9.8 per cent. The statement is notable for the large increases in Portland cement, pottery, mica, iron, nickel, copper, arsenic and silver, and for the appearance for the first time of corundum, feldspar and steel as mineral products of Ontario. Talc shows a large increase, while the products of zinc fell considerably. The large falling off in gold is ascribed to the shutting down for a time of several producing mines in the northwestern part of the province.

GEORGE MERCER DAWSON.

George Mercer Dawson, for six years past director of the Geological Survey of Canada, died at his residence in Ottawa, March 2d, after a brief illness. Acute bronchitis was the immediate cause of his death. He was the son of the late Sir J. W. Dawson, the eminent geologist, and was born in Truro, Nova Scotia, in 1849. He graduated from McGill University, Montreal, in 1869, and in the same year entered the Royal School of Mines, London, where he remained for three years. He was first in his class to pass, being awarded the Edward Forbes medal and prize in palaeontology and natural history. Returning to Canada he was engaged in mining surveys in Nova Scotia and also lectured in Morrin College, Quebec. In 1873 he received the appointment of geologist and botanist to Her Majesty's North American Boundary Commission, which was engaged in fixing the boundary line between Canada and the United States from the Lake of the Woods to the Rocky Mountains. In this capacity he served for two years, and prepared a highly satisfactory report, with plates and maps, on the geological and other resources of the country. In this connection he also prepared a report on the Lignite of the Tertiary Formation, a memoir on the superficial deposits of the great interior plains of America. On the termination of his labors on the boundary survey, he was appointed to the staff of the Geological Survey of the Dominion in 1875. He became assistant director in July, 1883, and in January, 1895, he was appointed director of the Survey to succeed Dr. A. R. C. Selwyn.

His work for the Geological Survey was chiefly in British Columbia and the Northwest Territories, and while in the discharge of his official

GEORGE MERCER DAWSON.

duties he explored a large portion of the western country, including in one case a boat journey of 1,300 miles. He rendered important services to Canada in calling attention to the mineral resources of the Rocky Mountain region and British Columbia, and he was one of the first to appreciate their great importance to the Dominion. His explorations in the Yukon Region were found to be of great value later, when gold was discovered there.

In 1891 he was appointed one of the Behring Sea Commissioners, and in this connection visited the western coast of Alaska, the eastern coast of Siberia and the intervening islands. In the following year he was a member of the joint commission which met in Washington to deal with the fur-seal question and his investigations were of very great service. He is the author of many reports, most of which were published by the Canadian Survey. Among the more important of these are: On the Queen Charlotte Islands, including, as an appendix, a monograph on the Haida Indians (1878). On an Exploration from Port Simpson on the Pacific Coast to Edmonton on the Saskatchewan (1879). On the Region in the Vicinity of the Bow and Belly Rivers (1882-4). On the Physical and Geological Features of Part of the Rocky Mountains (1885). Notes to Accompany a Geological Map of the Northern Portion of the Dominion of Canada (1886). Author (with Dr. Selwyn) of Descriptive Sketch of the Physical Geography and Geology of Canada (1884). Author (with Dr. W. F. Tolmie) of Comparative Vocabularies of the Indian Tribes of British Columbia, with an Ethnological Map (1884). Also numerous and valuable papers and geological, geographical and ethnological observations made in the course of his explorations and contributed to the Survey Reports and to various technical journals. He wrote a brief article on the Coals of the Canadian Northwest for Volume VII of "The Mineral Industry."

Dr. Dawson's life work was in connection with the Geological Survey of Canada, and for that he was honored in his lifetime and will be remembered. He received the degree of LL. D. from Queen's University in 1890, and a similar degree from McGill University in 1891. In the same year he was awarded the Bagsby gold medal from the London Geological Society for his services to the science of geology. He was also a fellow of the Royal Society of Geology of London. In 1893 he was elected president of the Royal Geological Society of Canada; in the following year was made a corresponding member of the Zoological Society of London, and in 1895 was elected a fellow of the American Association for the Advancement of Science. In 1896 he was appointed by the Council of the British Association president of the geological section for the Toronto meeting of the association, and in the next year was awarded the yearly gold medal of the Geological Society for his work as a whole.

THE MONTREAL MEETING OF THE CANADIAN MINING INSTITUTE.

Reported for the Engineering and Mining Journal.

The annual meeting of the Canadian Mining Institute began at the Windsor Hotel in Montreal on Wednesday, March 6th, with a good attendance of members. President S. S. Fowler was unable to be present, and Mr. John E. Hardman, of Montreal, occupied the chair.

Several new members, recommended by the council, were elected, after which the treasurer, Mr. J. Stevenson Brown, submitted his annual report, showing that the receipts, including a balance from the previous year of $484, had amounted to $4,055, and the expenditure to $3,425, leaving a balance of $630 on hand.

The report of the secretary, Mr. B. T. A. Bell, spoke of the continued growth and prosperity of the Institute, which now had a membership of 323, including 14 student members. The loss of 6 members by death was deplored, and the secretary remarked that since his report was prepared, Dr. George M. Dawson had passed away. He was sure that every member of the Institute and every mining man in Canada deplored the untimely and unfortunate loss this country had sustained in the death of the director of the Geological Survey of Canada. The Institute had already taken steps to put on record a permanent memorial of its appreciation of what Dr. Dawson had done for the mineral development of the Dominion, and had opened a subscription list, to which the Institute had subscribed $100, for the purpose of painting a portrait, to be presented, in conjunction with that of Dr. Selwyn, to the museum of the Geological Survey. At a later stage of the annual meeting Dr. Ami would present a review of Dr. Dawson's work. Mr. Bell concluded by stating that he would subsequently add to his report by presenting a review of the mineral industries of the country.

The report was adopted, and Messrs. W. Blakemore, P. Kirkgaard and the chairman were appointed a committee to prepare a resolution on Dr. Dawson's death, and they subsequently presented the following, which was unanimously adopted:

"That the Canadian Mining Institute, in annual session assembled, desires to place on record its sense of the deep loss sustained by the Dominion of Canada, and especially by the mining profession of this country, in the lamentable death of Dr. George M. Dawson, late director of the Geological Survey of Canada. It recognizes the immense value of the services which he rendered in the important position which he occupied with such distinguished ability, and not least, the high qualities of mind and personal characteristics which he displayed. The Institute wishes further to express its sympathy with his surviving relatives in their irreparable loss, and herewith forwards a copy of this resolution to them."

Messrs. W. Blakemore, Montreal; Charles Brent, Rat Portage; and P. Kirkgaard, Deloro, were appointed scrutineers of the ballots for the election of officers.

Mr. B. T. A. Bell called attention to the inadequate remuneration received by those engaged in the Geological Survey, and considered that it was no wonder the best men were being allured elsewhere at considerably higher salaries. It was the duty of the Institute to call the attention of the Government to the fact that the salaries received by the gentlemen engaged in the Geological Survey were wholly inadequate to the services they were rendering to the country. He thought that the Institute should also urge the necessity of providing suitable quarters for the geological specimens which were housed at Ottawa. The present accommodation was not only inadequate, but might be destroyed by fire or tumble down upon the members of the staff at any time. The Institute ought to frame a suitable resolution to the Minister of the Interior and the Premier insisting that the men not only be better paid, but the specimens better housed.

Dr. Goodwin endorsed Mr. Bell's remarks, and said that the Government did not show by the amount of money it appropriated sufficient appreciation of the scientific development of the country. The resolution should be worded strongly enough to make some impression at Ottawa.

On the motion of Prof. Carr-Harris, a committee was appointed to prepare a resolution on the subject and to act as a delegation to present the same to the Government. The committee consists of Prof. Carr-Harris (chairman), Kingston; Dr. Adams, Montreal; Charles Fergie, Westville, N. S.; W. Blakemore, Montreal; B. T. A. Bell, Ottawa; A. J. Moxham, Sydney, C. B.; H. M. Whitney, Boston; F. H. Clergue, Sault Ste. Marie; Bernard McDonald, Rossland; S. S. Fowler, Nelson, B. C. and J. M. Clark, Toronto.

Consideration of the place where the summer meeting should be held was then taken up, and it was decided to recommend that it be eastern Ontario, with Belleville as the center.

Prof. Carr-Harris referred to the proposed bill to be presented to the Ontario Legislature for the incorporation in that province of the Canadian Society of Civil Engineers, which has already obtained incorpora-

tion in the Province of Quebec, and spoke against its attempt to become a close incorporation. The meeting then adjourned.

At the evening session the first paper was read by Mr. William Blakemore, on "Pioneer Work in the Crow's Nest Coal Areas," illustrated by lantern slides. He referred to the fact that the late Dr. G. M. Dawson was the first, in 1881, to recognize the possibilities of these coal areas, and said that while he might be called the scientific pioneer of the Crow's Nest Pass, it was right to tender a meed of praise to the men who first discovered the existence of coal, and especially to William Fernie, who, in the late seventies, discovered the outcrop of the 30-ft. seam, and from then until 1896, when the Crow's Nest Pass Coal Company was formed, with himself as a director, never ceased to clamor for the building of a railway, and the development of the mines. But for the tenacity and ability with which he clung to his scheme, there would probably to-day not have been either a Crow's Nest Pass or a railway. Mr. Blakemore described the location of the coal areas, and said that they were not less than 150 square miles in extent of workable coal, and Dr. Selwyn had estimated the quantity at 24,976,000,000 tons. He spoke of the conditions under which the coal field was occupied, and the safeguards that had been put around it by the Legislature, and concluded by saying that he considered it would furnish the key to western mining and settlement in the future, and that long after those engaged in the pioneer work of that section had been called to another sphere, Western Canada would be enjoying the fruits of their labors.

Dr. Frank D. Adams contributed some "Notes on the Iron Ore Deposits of Bilbao," illustrated by slides. He referred to iron ore deposits in general in Spain, and said that the most important, and those which seemed to be, as far as we know, more extensive, lay in the Basque Province, and, finding their port of shipment at Bilbao, were commonly known as the Bilbao deposits. Although the ores were worked from very early times, they found their greatest development with the inauguration of the Bessemer process of steel making. About 87 per cent. of the iron ore imported by Great Britain was shipped from these mines. By those who had studied these deposits it was said that the ores were getting poorer in quality and were nearing exhaustion, but as there were others in the interior of Spain, it might be considered that for some years to come the Spanish supply of ore would continue undiminished.

Dr. B. T. A. Bell then took the floor and expressed the pleasure he had felt on learning, through the press, that no successor had yet been appointed to the late Dr. G. M. Dawson, and said that the council had on the previous evening come to the conclusion that the gentleman who should be the director of the Geological Survey of Canada was Dr. Frank D. Adams. Mining men in the Dominion had recognized that Dr. Adams, young, vigorous, skillful, was the very man who should be in charge of that very important department of the public service, and it was hoped that the Mining Institute would yet be able to place before the Government its wishes that Dr. Adams should receive the appointment. Mr. Bell moved that the Institute use its best influence toward securing the appointment of Dr. Adams as director of the Geological Survey. This was seconded by Mr. James F. Lewis, supported by the chairman, and carried unanimously.

A short discussion took place on the papers which had been read, and after this the secretary was authorized to send the following telegram to Hon. Clifford Sifton, minister of the interior:

"Canadian Mining Institute, at large and representative meeting tonight, unanimously recommends the appointment of Dr. Frank D. Adams, a former member of the survey staff, and professor of geology at McGill, as successor to the late Dr. G. M. Dawson."

In connection with students' prizes, it was announced that Mr. Charles Fergie, of Westville, N. S., would give a gold medal to the students submitting the best paper during the year.

At the Thursday afternoon session the first paper submitted was that by Mr. J. Obalski, inspector of mines, Quebec, and which was "Notes on the Magnetic Iron Sand of the North Shore of the St. Lawrence." He pointed out that the deposits had always been known, and forty years ago they attracted largely the attention of business men as being a source of iron ore of the best quality, and the highest grade. In 1867 a company was organized in Montreal, and bought large tracts of land in the vicinity of Moisic, built eight bloomary furnaces, using the magnetic sand as ore, and charcoal as fuel. The product of these furnaces was sent to the United States, or used in Montreal at a rolling mill controlled by the company. Nevertheless, the chief market was in the States, where the product of the furnaces was shipped, submitted to the duty on pig iron. In March, 1875, under the protest of the American iron workers, it was declared subject to the duty of bar iron, say 1½c. per pound, which compelled the company to shut down the work, and to go into liquidation, owing to the absence at that time of a sufficient Canadian market. Eighteen months ago he (Mr. Obalski) had made a personal visit to the Coast, from Sheldrake to Natashquan, with the result that he was very favorably impressed by the magnitude of those deposits. The sand did not occur all along the coast, but only in several places, the most important being Natashquan, Moisic and St. Jean.

Dr. A. R. Ledoux, of New York, gave some very interesting "Random Notes on the Oregon Nickel Mines," and this was followed by papers on "The Treatment of Auriferous Mispickel Ores," by Mr. P. Kirkgaard, of Deloro, and Mr. Sydney B. Wright, of Deloro.

In the discussion which took place on the papers submitted by the two last-named gentlemen, Mr. Hungerford spoke of the North Hastings areas, and particularly the mispickel belt. He said that of the many thousands of people who went to that district to look for gold in the early spring of 1867, he was the only one left. He had been in that section ever since then, and had been connected with mining almost continuously from that time, although engaged in other pursuits, and had seen the rise and fall of every enterprise that had taken place from the excitement of the Richardson Mine until the present time. Himself and Mr. McDermot, an old Australian miner, were the first to discover gold in the township of Marmora, some 900 ft. from where Mr. Kirkgaard was now operating. No one was prouder than he to think, after a long time spent in that section, that the ores in that particular belt had been mastered, and they could now look forward with confidence to the success of that section of mining country, and before long they would see many mills in operation there. In the early treatment of these ores, if they got 40 per cent. of the gold on the plates by amalgamation, they thought they were doing well. He was now obtaining from 75 to 82 per cent., and that from ores which, a few years ago, were considered almost beyond treatment. A false impression with regard to that section of the country was that all the ores were supposed to be refractory. That was not the case. In the townships of Marmora, Madoc, Tudor and elsewhere the free milling ores would go from 40 to 120 ft. wide, and he had no doubt that when the country became known and capitalists had their attention drawn to it, in a few years large mills would be working these deposits.

Dr. H. M. Ami, of the Geological Survey, read a very appreciative obituary of the late Dr. G. M. Dawson. He referred to the works of the deceased, and said that through Dr. Dawson's energies and those of his staff, much had been done to establish mining in Canada, and that on a non-speculative basis. Dr. Dawson had done much in disseminating a knowledge of the West, and his death was an irreparable loss to Canada and science, and especially to the Geological Survey.

At the evening session on Thursday Messrs. Geo. Macdougall and G. F. De Courtenay were re-elected auditors, after which Dr. W. L. Goodwin, of Kingston, read an interesting paper on "The Analysis of Corundum," remarking that corundum was now being produced by the Canadian Corundum Company of a very high grade, viz., 95 per cent. of pure corundum. When it was remembered that hitherto manufacturers had contented themselves with a corundum of 80 per cent., it looked as if the Canadian product should have a good market, because the pure product would be preferred by manufacturers of emery wheels and the like.

Secretary B. T. A. Bell then read a report prepared by him on the Mineral Development of Canada in 1900. According to the returns in the hands of Mr. Ingall, of the Geological Survey, the increase in mining products last year was 35 per cent., while, according to Mr. Bell, the figures are $40,000,000 for 1899 and from $63,000,000 to $65,000,000 last year.

Taking up the figures for the different provinces, Mr. Bell said that in British Columbia the lead production had been four times as great as in 1899; silver, nearly 35 per cent.; copper, nearly 20 per cent.; lode gold, 20 per cent.; coal, about 120,000 tons increase. In the Yukon the gold production was at least $25,000,000. On the North Saskatchewan River gold dredging was only in an experimental stage, and in Alberta the output of coal was: Bituminous, 304,000 tons, and anthracite, 17,500 tons, and the formation of new companies indicated considerable development in the near future. In Assiniboia the production of lignite would show an increase over previous year. In Manitoba a large number of mining claims had been recorded during the year, and several gold mining properties were being opened up, while the gypsum deposits lying north of Lake St. Martin were being rapidly staked out.

The total value of minerals produced in Ontario during 1900 was $9,286,424; number of workmen employed, 11,109, and paid in wages, $3,164,400. With the exception of gold, the output of which was 18,767 oz., valued at $297,861, there had been an increase in almost all the minerals produced in Ontario. Mining in Quebec was chiefly remarkable for the flourishing condition of the asbestos industry, the approximate output of which was 23,251 tons of all grades of fiber, and nearly 7,000 tons of asbestic, estimated to be of a value of not less than $1,000,000. Iron ores showed an increase over previous years, and in minerals of all kinds, Quebec might be credited with an increase of $500,000 over 1899.

In Nova Scotia the output of coal had been the largest in the history of that industry, the sales amounting to $2,955,000. The output of gold amounted to 31,110 oz. as compared with 27,772 oz. in 1899. The total production of minerals in Nova Scotia might be estimated at $11,000,000. Considerable development had taken place in New Brunswick in the production of manganese, and there was some talk of the erection of a ferro-manganese plant near Moncton. The oil shales at Baltimore were also being developed with a view to exporting to the British market.

A vote of thanks was tendered to the secretary for the paper. In the course of some further remarks, Mr. Bell pointed out that the failure of the mines in the Rainy River Region to fulfil the hopes that had been founded on them was due not to the mines themselves, but to incompetent management and injudicious speculation. He also inveighed against the attempt to have an export duty imposed on iron and steel. This industry afforded work to a great number of Canadian workingmen, and should be encouraged in every way, and an export duty would have the effect of preventing the export, and thus depriving the Canadian workingmen of considerable employment. He also expressed his regret that the figures showed that mining machinery that could not be manufactured in Canada was imported in far greater quantities from the United States than from England. He suggested the fixing of a new free list for mining machinery, as the last list had been fixed at short notice, and did not include many articles which were not manufactured in this country.

Mr. Ingall, of the Geological Survey, gave the result of the reports so far received by the Geological Survey. The returns were not complete, but they showed throughout the Dominion an increase of 35 per cent. in the value of the minerals during the year. The quantity had increased in a greater proportion probably, but the prices in some cases were less.

At the business session on Friday morning, March 8th, the scrutineers presented their report on the result of the balloting for office-bearers for the year 1901-02. The following were declared elected:

President—Charles Fergie, Westville, N. S.

Vice-Presidents—R. R. Hedley, Nelson, B. C.; Graham Fraser, New Glasgow, N. S.; Dr. Frank D. Adams, Montreal; James McArthur, Sudbury, Ont.

Secretary—B. T. A. Bell, Ottawa.

Treasurer—J. Stevenson Brown, Montreal.

Council—For British Columbia, John B. Hobson, Quesnelle; W. F. Little, colliery manager, Anthracite, N. W. T.; E. B. Kirby, Bernard Macdonald, Rossland. For Ontario, Prof. Courtenay De Kalb, Kingston; P. Kirkgaard, Deloro; Major R. G. Leckie, Sudbury; R. G. McConnell, Ottawa. For Quebec, George R. Smith, Thetford Mines; James T. McCall, Montreal; James F. Lewis, Sherbrooke; J. Burley Smith, Montreal. For Nova Scotia, R. E. Cnambers, Bell Island, Newfoundland; D. W. Robb, Amherst; J. R. Cowans, Springhill; R. F. McNaughton, Forest Hill.

Dr. J. B. Porter read some "Notes on Laboratory Work at McGill," after which Mr. Hardman spoke of the great value of the experiments made at McGill, on account of their disinterestedness. As a money-making profession, mining engineers must depend for much accurate information on this work, done without hope of reward.

The meeting then resolved itself into a students' session, papers being read as follows: "The Coal Mines at Fernie, B. C.," Mr. C. V. Corliss, McGill; "The Concentration of Silver Lead Ore at Gem, Idaho," Mr. W. M. Edwards, McGill; "Notes on Crushing and Screening under Varying Conditions in the Ore-Dressing Laboratories at McGill University," Mr. W. G. Flint, McGill. A paper on "The Coal Mines at Sydney, C. B.," was also read by Mr. Ritchie.

At the afternoon session, Mr. Hardman, in retiring from the chair, which he had occupied in the absence of the president, introduced the new president, Mr. Charles Fergie, who briefly returned thanks for the honor that had been done him by electing him to the position of head of the Institute, and took the chair.

Three new members having been elected, Mr. J. M. Clark, Toronto, submitted a paper on "Company Law," in which he referred to the law of Ontario and to that of Quebec, as well as to the law of the Dominion, and pointed out the most important provisions of the new English law. In conclusion, he said that it would be greatly in the interest of all the provinces and the Dominion if we had a comprehensive system of company law, which would be practically uniform throughout the whole of Canada, and be in such shape that it would be easily understood and authoritatively declared, so that mining men would know exactly what the law was in any province of the Dominion in which a company proposed to do business.

Prof. W. G. Millar, of Kingston, read a paper on the Iron Ore Fields of Ontario, and said that from what he now knew of the iron ore fields of the province, Ontario was assured of a great future as an iron ore producing country. It should in the not far distant future take its place as an iron ore producer second to no other country.

This concluded the business session of the Institute and an adjournment was taken.

The meeting was brought to a close Friday evening by a dinner given at the Windsor Hotel. Nearly all the members who had been following the proceedings of the Institute were in attendance and a pleasant evening was spent, songs and instrumental music being pleasantly interspersed with short, pithy speeches.

We give below abstracts of some of the papers read at this meeting of the Institute:

The Magnetic Iron Sand of tne North Shore of the St. Lawrence.

By J. Obalski, Quebec.

Those deposits have always been known, and 40 years ago they called largely the attention of business men as being a source of iron ore of the best quality and of the highest grade. In 1867, a company called the Moisic Iron Company was organized in Montreal, and bought large tracts of land in the vicinity of Moisic, built on the spot 8 bloomery furnaces, using the magnetic sand as ore, and charcoal as fuel. The product of these furnaces was sent to the United States, or used in Montreal at a rolling mill controlled by the company. Nevertheless, the chief market was in the States, where the product of the furnaces was shipped, submitted to the duty of pig iron. In March, 1875, under the protest of the American iron workers, it was declared subject to the duty on bar iron, say 1½c. per lb., which compelled the company to shut down the work, and to go into liquidation, owing to the absence at that time of a sufficient Canadian market. In August, 1868, when Dr. Sterry Hunt visited Moisic, out of the 8 furnaces built, there were 4 in operation, giving a total of 3 tons of iron for 24 hours with 12 men, using 1,400 bushels of charcoal, say 466 bushels per ton of iron. The concentration of the ore was then made by Dr. H. Larue's process, consisting in magnets under which an endless table passes with the sand on it. The magnetic portion was attracted, but there was a fine clothing under the magnet, and by moving it down, the iron sand was put loose and dropped in a receiver. It is said that 1 ton of pure ore was obtained, out of 2 or 3 of sand per day for each machine.

Several processes have since then been suggested for agglomerating the magnetic sand, but since the abandonment of this industry, no other attempt has been made. A company, called the Natashquan Magnetic Iron Company, shipped from that place some quantity to England, for trial. I heard that the ore was successfully smelted, but no practical result was obtained, probably on account of the difficulty of shipment.

The black sand contains grains of quartz, garnets, and other hard minerals, besides of magnetic and titanic iron. I never found a trace of gold, although it is claimed that there is some. Analyses given in Dr. Sterry Hunt's report to the Geological Survey show that all the iron is indicated in the state of protoxide in the analysis of the raw ore or of the non-magnetic portion, on account of the difficulty of determining the degree of oxidation of the iron in the titanic mineral.

Eighteen months ago, I made a personal visit to the Coast, from Sheldrake to Natashquan, with the result that I was very favorably impressed by the magnitude of those deposits. It must be remarked that the sand does not occur all along the coast, but only in several places, the most important being Natashquan, Moisic and St. Jean. I have not visited the Moisic deposit, but from several reports I have in hands, I understand that the quantity of black sand is large, and extends for quite a distance east of Moisic River. The nearest harbor is the Seven Islands Bay, 16 miles from Moisic.

The beach sand has been produced by the disaggregation of ferruginous rocks of the Laurentian formation including anorthosites, against which the sea has broken during geological periods of indetermined length, and the matter so produced has been subjected to a natural concentration slightly different from that which occurs in an ordinary stream. These deposits are chiefly observed about the low points, denuded of rocks, and their number is limited. It is very probable that the sea level has been lowered, and that, as the same phenomena occurred formerly, similar deposits may be found in the low-lying spots at a certain distance from the present sea-shore. This fact seems to have been ascertained by explorers and surveyors, and in the reports of the Department of Crown Lands and of Mines for 1899, a few facts are recorded regarding this point.

Immediately above the fishing station known as Dock Bay, between Thunder and Jupitagan rivers, a little black sand is found in the bay, on a length of 500 ft. and a width of 30 ft. On a point where the shore has been eaten away by the sea, there is a thickness of 10 in. surmounted by 5 in. of yellow ocher.

The St. John River deposit extends from the mouth of that river for a distance of 6 miles to the northeast, but the greatest development is in sight at Pointe Noire, 4 miles from the River St. John. The black sand is visible on the surface in beds more or less rich, with a thickness varying from 2 or 3 in. to 10 in. I measured the beach from low water mark to 100 and 300 ft., where there is an intricate growth of small spruce trees making it difficult to see anything; but this soil may also contain ore. The river St. John can be entered only at high water and by small schooners.

From Pointe Noire to Mingan River, the shore is flat and the sand is also mixed with black sand. I did not find a great abundance of it, but as the action of the sea alters the look of those beaches, according as the black sand is more or less on the surface, it is possible that there may be enough to work at or at least that by prospecting a little inland, it may be found in greater quantities. The nearest deep water harbor is Mingan, but the River St. John could be used for loading small schooners or barges which could be towed to Mingan (12 miles), for supplying large vessels. Continuing along the coast, I found but little black sand, the shore being generally rocky. At Esquimaux Point, the beach is sandy, but I did not find it in workable quantities.

From the mouth of the Great Natashquan River toward the East, for a distance estimated at 20 miles, there is in sight between the low water mark and the timbered ground, a stripe of sand formed by the flat beach from 100 to 400 ft. wide, and of dunes ranging from 5 to 50 ft. in height, and extending backward 600 ft. from low water mark. The black sand is distributed all tnrough that area in alternate layers of varying thickness, going from 1 in. to 2 ft. with a practical yield of black sand from 20 to 95 per cent. I have measured sections of the dunes which for 15 and 20 ft. in height would give from 40 to 60 per cent. of black sand as an average. It can be seen also on the east shore of the Natashquan River itself. It is said that it continues as far as Gaghaska River and is found in this bay and the Musquarro.

The average proportion of black sand may be considered as 40 per cent., the quantity of pure magnetic iron being 25 per cent., containing from 68 to 70 per cent. of magnetic iron. Now, if we take an average depth of 20 ft., a width of 600 ft. only, we will have, for each mile, over 1,500,000 tons of ore of 68 to 70 per cent. of iron, taking 300 lbs. as the weight of a cubic foot of such ore. The tonnage is considerably larger, as we take only 600 ft. of beach to the line of trees. This beach, as well as the others I have seen, is exposed to the sea, and there is no harbor in the immediate vicinity, the nearest being that of Little Natashquan, 4 miles to the west of Great Natashquan. This harbor is well protected, and could easily be made accessible to vessels of heavy burthen. It is surrounded by granitic hills and protected toward the sea by islets of the same rock. On the Great Natashquan, 12 miles from the sea, is the first fall, 30 or 40 ft. high, which could supply the motive power for large mills, and it is followed by three other falls separated by intervals of from two to three miles.

According to the above, the beach deposits are generally in sight for several miles on low shores exposed to the open sea and without harbors or shelter. Large vessels loading ore there would have to anchor at a considerable distance from the shore, and special flat-bottomed lighters of small dimensions would be required to convey the ore in sacks to the large vessels which would hardly be practicable. It would be necessary to seek for the nearest harbors, to have the sand concentrated and purified on the spot and the merchantable product conveyed by tramways to the point of shipment. It will therefore be seen that the working of these deposits must be done on a large scale, and that it would require considerable capital for the manipulation of large quantities by mechanical process and for purifying and conveying the product to suitable harbors.

The working of the sand should be done by means of steam shovels feeding cylindrical driers, whence the ore would be taken to electro-magnetic separators. When separated, the magnetic oxide would be loaded in small cars which, by means of tramways, would convey the ore to the wharf, where it would at once be loaded on the vessels or be kept in elevators. The motive power could be supplied by the water-power in these regions, and the fuel would consist of fire-wood cut in the neighborhood, or of Nova Scotia coal which could be landed there for $3 a ton at the most. The season of working would extend from May to October, say, six months.

Sufficient ordinary labor could be obtained and the manipulation of the sand should, as far as possible, be effected by mechanical means. As for the use of the ore, I think that the Iron and Steel Works at Sydney, C. B., could use part of it as a mixture, the distance from the deposit to Sydney harbor being between 300 and 400 miles, while coaling steamers returning from Quebec could take it as a backward freight to Nova Scotia. The distance from Natashquan to Quebec is about 500 miles, and from Moisic, 300. The three principal deposits on the North Shore are in the vicinity and to the east of the Moisic,

St. John and Great Natashquan rivers, but there are also less important ones at Portneuf, at Jeremie Bay (west of Betsiamis River), at Manitou River, at Dock Bay and in the bays of Kaghaska and Musquarro. It is also reported that thin layers of black sand on the North West arm of St. Augustin River for a distance of 30 miles.

A Simple and Convenient Instrument for Mine Surveys.

By Frank Robbins, North Star Mines, British Columbia.

In many cases it is necessary to make examinations in a limited time and under circumstances where it is impossible to send back for instruments. In the light of such experiences I hit upon a simple and convenient instrument, and with the aid of the accompanying cuts I will endeavor to describe it.

First I will assume that a compass which may be read to half a degree will come within the bounds of accuracy required. That, when local attraction is manifest, back and foresights will be taken at every station and the included angle between them read, after the old country fashion of blind dialing. Where attraction does not exist the instrument is to be set up at alternate stations only, and the middle station established by fore and back sights as in the ordinary compass practice. That the bottom plate of the dial have a semi-circle divided thereon, and graduated both ways from the E or W point from 0° to 90°, with a pendulum indicator suspended from the center pin traversing this semi-circle by which angles of elevation and degression may be taken when the dial is set in a vertical plane.

Many years ago I came into the possession of a pocket compass, made by Gurley, of Troy, N. Y., this consisted of a flat square plate about 5 in. square, upon which was set a compass dial with the above pendulum attachment for vertical readings; this compass was provided with two folding sights. It was a good pocket compass. By laying the edge of the square plate upon a wall or upon a ladder I could read slope angles. By levelling it upon a few rocks and lying down upon my stomach in a wet drift I could get a bearing through the two sights with a fair degree of accuracy. By holding it in my hands and averaging the run of the needle through its oscillations I could also usually guess a bearing somewnere within 5°. It struck me that this instrument was susceptible of improvement and that a light tripod to which the compass could be attached would prove a convenience. The tripod was easy enough; the attachment, however, had to be considered. The ordinary ball and socket joint was the first suggestion; but while this would admit of reading the needle to perfection, it would not admit of the taking of readings in the vertical. I happened about this time to run across, in an old book of mechanical movements, the cut of an universal joint—"Goyjot's joint," it was called, if my memory serves me—which I thought would do. This consisted of a spare block of metal with a bended plate on top and another underneath, these plates being attached to the block by screws running through the latter, one above the center and one below it and at right angles to each other, thus admitting of the plate C passing through a semi-circular arc at right angles to the axis of the upper screw d. The block E has also a range of movement in arc at right angles to that of C and around its pivot, the lower screw d. I made such a joint of wood and sheet brass and saw that it would answer the purpose. I sent this pattern to John Roach—the old instrument-maker of San Francisco—who made for me the joint shown in Fig. 1.

A disc is centered and braced to the bottom of the compass; into this disc a female screw is tapped. A shows a male screw corresponding to this and by which the compass and milled-headed disc B are attached to each other. B is attached but not fixed to the bent plate C by means of another screw passing through a hole in C, and threaded into B. Thus B with the compass attached may be turned in any direction upon the surface of C. See Fig. 2.

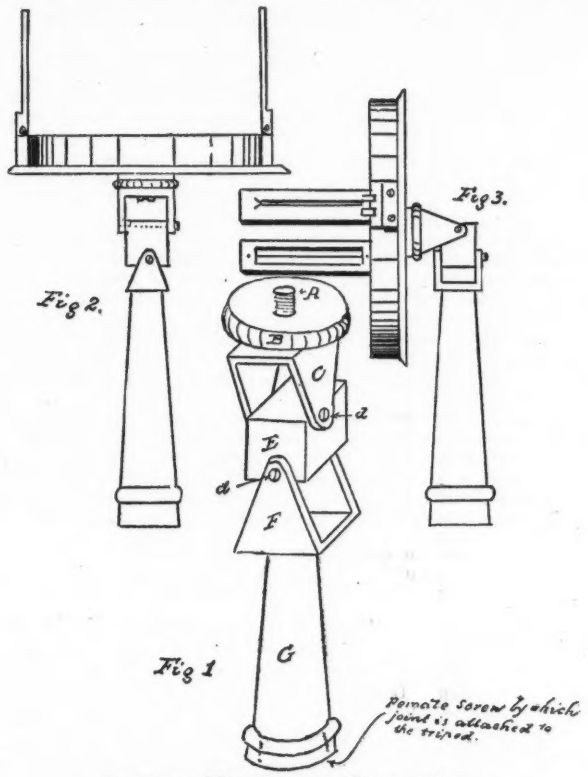
The bent plate C is attached to the block E by screw d passing through S but not fixed to it. The tension of the screw is sufficient to hold C in any position of its range of movement. The bent plate F is attached to the block E in the same way and E has a range of movement at right angles to that of C. The bent plate F is fixed to the hollow spindle G, which is screwed to the solid spindle of a simple tripod. It will be evident from Figs. 2 and 3 that not only can the instrument be leveled for horizontal observation; but it can also be turned into a truly vertical plane for dip readings with its pendulum clinometer. In the position shown in Fig. 3 it is evident that an off-set (equal to the distance from the point of sight—usually taken at the end of the sights near the compass box—to the center of the top of the block E) is made between the positions of the instrument in horizontal and vertical sights. The compass center being coincident with the center of block E when the instrument is set for horizontal reading. Correction may be made for this off-set, practically the same as for transits with parallel telescopes; but the error is so small that, with the limitations of the instrument, it may be disregarded.

With the above described joint and a light tripod it will be seen that I now had an instrument which was stable and by which I could take angles of elevation and depression and also horizontal ones within the range of sight possible between the top and bottom of the two folding sights; in fact, in this last respect, having the same range of service as the land surveyor's plain compass. But as bearings have to be taken down steep inclines something further was necessary. This was hit upon in the expedient shown in Fig. 4 and consists of a pair of sights with a peep-hole in one and a round opening with cross-hairs in the other; the construction of this admits of sliding it either way upon either of the folding sights of the compass—usually over the open or fore sight. With this attachment in place it is possible by raising or lowering the folding sight to which it is attached to look down any depression or up any elevation. Fig. 5 shows the application of this attachment to a sight down an incline.

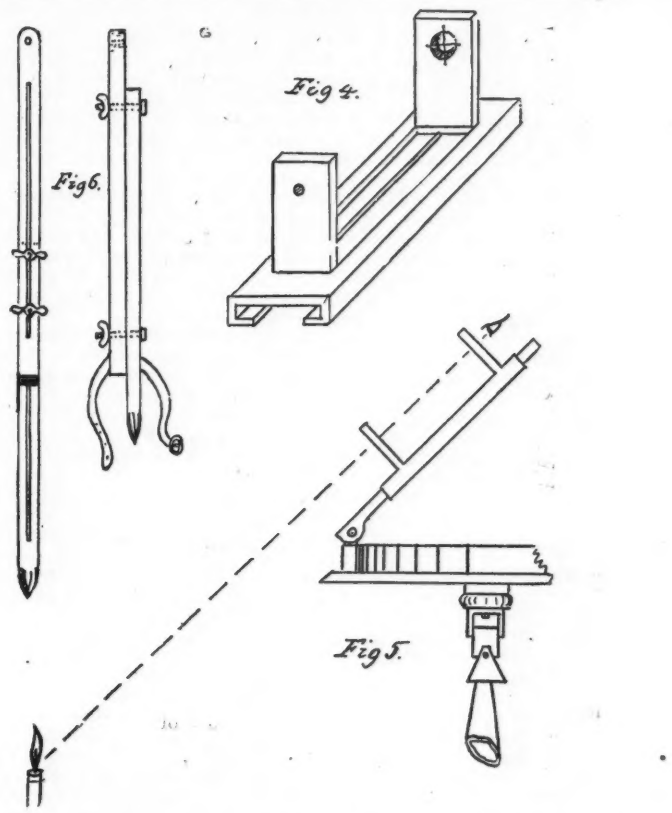
In practice it is usual to take the bearing of the incline first and to establish the point, if underground, by a candle; the instrument is then turned over as in Fig. 3 and the angle of dip taken to the same candle, and this recorded, with or without the correction for the difference between the centers of the instrument in the two positions. When the instrument is in use the slide sight is usually left attached to it, when not, it is detached and dropped into the pocket. In fact, the whole instrument—with exception of the tripod, and even that with the legs off—can easily be accommodated in an ordinary coat pocket.

Knocking about in out of the way places and packing one's belongings on horse or mule back, every ounce counts and every cubic inch becomes an encumbrance; hence a tripod between 4 and 5 ft. in length does not add to the comfort of a trip. As the legs of the one for this little compass were light they could be easily replaced; so I took to leaving them behind, depending upon the country and a jack-knife to furnish a new set, but sometimes straight sticks were not easily obtainable. A mine carpenter and a mine blacksmith between them constructed the device snown in Fig. 6 and it has proved a useful tool ever since and has never been obtrusive in the pack. It is not material whether the lower part of a tripod leg slides into the upper, as is usual, or lies alongside as it does in this.

The construction is as follows: A strip of hardwood about 1 in. wide



IMPROVED MINE SURVEY INSTRUMENT.



(depending upon the sockets of the tripod head) and 1½ in. deep, a trifle shorter than the ordinary tripod leg, is cut in two. Each half is then ripped through the major part of its length, say to within 3 in. of each end; the slit is enlarged to about 3/16 in., it is on the deep side and as accurately as possible in the middle of this. The two pieces are of equal rectangular section; that is, they do not taper, except the lower one, which at the end is trimmed to a point and tipped with iron. Two brass screws with square heads and thumb-screws are fitted to each pair of pieces. These screws couple each pair together through the long slot and by means of them the tripod legs can be extended to their full length for use or reduced to the length of a roll of blankets.

I have had the simple instrument above described in use now for a good many years and it is still in perfect condition. The attachment of the bent plates C and F to the block E by the screws d appear to be the only weak point; but these parts have not worked loose and the screws have always preserved the necessary tension to keep the surfaces in sufficiently close contact for the purpose required. The only improvement which suggests itself is that a larger compass could be substituted for the small one I use and that it have levels which mine has not. Such an instrumnet as Gurley describes as a pocket Vernier compass with 3½-in. needle would be admirable if the pendulum clinometer were added to it. With such an instrument as this the traverse could be run and the notes platted and the examination probably finished in less time than it would take to send for a transit; and for the purposes of the examination and report the plan would be quite as good as one made to minutes by a careful man with a high-class mining transit.

Shipping Coal by the Aerial Wire Rope System at Port Morien, Cape Breton.

By Joseph G. S. Hudson, Port Morien, C. B.

On Port Morien harbor and where Gowrie and Block House Collieries ship their coal, the Dominion Coal Company pier extends out from the shore to a point where the vessels had sufficient water to take in cargo, practically 1,000 ft. from the shore at high water mark. To attain this mark and build a wharf by the means in customary use in the district, meant, at a very conservative estimate, $25,000, allowing that the minimum depth of water at low tide was to be 14 ft., and from this point the wharf would have to be extended sufficiently for ocean steamers to load. By adopting the aerial tramway system you commence your shipping pier in the depth of water you wish to obtain for vessels, can place support towers from 325 to 375 ft. apart, between given points, and bring your wire ropes to the point where your coal is delivered from the screens, and so save to a very great extent a large expenditure in labor and material in building.

Commencing at the loading station, we have a small Jenckes engine with cylinder 9 in. in diameter and 12 in. stroke with a fly-wheel 42 in. in diameter, on this a 4-ply 8-in. rubber belt on a 42-in. Dodge split pulley, which drives a 2-in. shaft to a geared bevel wheel 5 ft. in diameter, which is placed horizontally on a 6-in. perpendicular shaft; immediately below is the rope wheel. The driving shaft making 14 revolutions per minute, this is nominally the motive power. The rope is 1⅛ in. in diameter ordinary Lang laid.

The driving wheel is situated at the near end of the loading station, in order to allow the shunt rail to extend further back than the loading point, so that sufficient room can be obtained to allow the empty buckets to come on the shunt rail, and radiate to the loading point and have enough space for standage room between the empty and full buckets. The terminal stations are built of 4½-in. by 9-in. scantling, uprights in concrete foot blocks. Bents 9 ft. centers and 7.6 ft. high, on which is suspended, by cast iron hangers, steel 3½ in. deep by ⅝-in. thick, forming the shunt rail. The carrier is so designed that it forms a clip on the rope, and is also provided with two wheels 6 in. in diameter, which come into operation when the buckets leave the rope at the terminal points, and are transmitted with the rope impetus to the shunt rail, both at the loading and unloading stations.

The buckets are of pressed steel and carry 850 lbs. of coal each. It has been demonstrated by practical working that an excessive weight in the buckets causes a much heavier and expensive plant, and that the better method is to move a small load quickly and often than a heavy load slowly.

When the bucket is filled at the loading station, the operator simply gives the loaded bucket a shove, the wheels on the carrier running along the shunt rail until it comes in contact with the moving rope, which conveys it along at the same speed as that which the rope is moving. At 100 ft. from the loading station is a tower 11 ft. high with a cross-arm of sufficient length to spread the rope apart, so that the loaded bucket going out on the full rope will not come in contact with the empty bucket returning on the other rope travelling in the opposite direction on which the empty bucket runs. On all these towers are suspended by means of self-moving bracket arms 4 wheels in line on the full side and 2 wheels in line on the empty side. These wheels are so balanced that they dip down to accommodate the sag of the rope when the bucket approaches the support tower, and make a return dip, when the buckets go with the sag of the rope from tower to tower.

When the loaded bucket arrives at the pier, the man operating the pier end runs the loaded bucket on the shunt rail until he comes to the place in the pocket where he dumps the coal, lifts up the latch, the bucket on the gudgeon tips over and returns; he then closes the latch, runs the now empty bucket round the radial end of the shunt rail, and gives it a good hard push; the wheels on the carrier run along the shunt rail until they come in contact with the rope which has gone round the tension wheel, the clip then comes into operation, and the bucket is suspended on the rope and is carried along, passing the support towers, and arrives again at the loading station. I mentioned before that the wharf was situated 1,000 ft. from the shore, and that the loading station is 200 ft. further to the pit mouth and the screens; the time occupied by a loaded bucket leaving the loading station, travelling out to the wharf, being unloaded, shoved round the shunt rail on the wharf, and returning to the end of the shoot to be reloaded is 10 minutes.

The capacity of the system guaranteed by the makers is 50 tons per hour but this, I am sure, can be exceeded. We operate our system, having a small boy to watch the engine, in case of any accident occurring, or an uneven distribution of the buckets, the rope having a tendency to race if the loaded rope gets too many loaded buckets placed on it in a short space. One man at the loading station filling the buckets from the mouth of the screen, and one man on the wharf to unload the buckets and run them round the shunt rail, and put them on the return rope, as already described, also to see that the wheels are kept greased and running all right. We weigh the coal in the buckets by one of Fairbanks' A scales, suspended on a section of the shunt rail.

The pier is designed as follows: The first 100 ft. to contain 4 pockets of 90 tons capacity each, for loading schooners with a draft of water up to 14 ft. at low tide, 200 ft. now being built for the steamer section and having a storage capacity of 800 tons, there being from 18 to 20 ft. of water at low tide along this section, plus 4 ft. for high tide.

The tension on the ropes is with a capstan and thread bar, the tension weight being 3 tons; it can be multiplied 4 times, giving a tension, if required, of 12 tons; but this we have not found necessary, the ropes running most satisfactorily, having considerable sag in the ropes between the towers. On this coast we have heavy gales, and I anticipated considerable trouble, thinking that the buckets might swing on the ropes, and strike against the support towers, but in the heaviest gales last autumn we ran the buckets both empty and loaded, and had no trouble whatever with them.

THE ONTARIO GOVERNMENT ASSAY OFFICE.

The laboratory report of the Ontario Government Assay Office located at Belleville and conducted by the Bureau of Mines for the assistance of prospectors and development of mineral lands, shows a total receipt of 88 samples sent in for examination during the month of February.

The assays and analytical determinations aggregated 189, each checked off by a duplicate in order to avoid errors before issuing certificates. Of these 46 were for gold, 23 silver, 8 nickel, 18 copper, 4 cobalt, 1 lead, 1 platinum, 1 miscellaneous.

Nine samples of iron ores from all parts of Ontario were received for partial or complete examination as to smelting quality, on which 17 determinations were made. Eight samples of raw and briquetted peat were received for analysis as to quality for fuel purposes, on which 56 determinations were made.

The Bureau of Mines required 118 determinations on which no fees were collected, 71 being done for private parties. The custom work for the public is done at actual cost, fees collected from this source amounting to $73.15.

Twelve samples for identification, or report as to probable commercial value, as well as for qualitive examinations, were received, on which fees amounting to $5 were collected. No charge is made for such examinations on samples brought personally to the laboratory. The office supplies, free of charge, canvas shipping bags, and manila mailing envelopes for small and crushed samples, to those requiring the use of such.

GOVERNMENT AID TO THE MINING INDUSTRY IN ONTARIO.

The Provincial Government is at present assisting the development of mineral deposits within the province along the following lines:

1. By sending out exploratory surveys to the unsurveyed portions of northern and western Ontario. During 1900 the Government spent $34,500 on ten survey parties, each of which included a geologist, and a timber and agricultural expert, whose reports will shortly be published.
2. By constructing mining and colonization roads in the new sections.
3. By maintaining two Government diamond drills, which can be rented by private parties at a nominal cost. These drills have proved of invaluable service in exploring the size and position of ore bodies preliminary to expensive development work.
4. By maintaining local agencies in the chief mining districts for the receipt of applications for mining lands, where prospectors and others may consult maps and obtain information as to lands open for sale, etc.
5. By preparing for exhibit collections of economic minerals of Ontario, one being at the Glasgow Industrial Exhibition, the other in preparation for the Pan-American Exposition to be held at Buffalo, N. Y.
6. By granting a bonus of one dollar per ton of pig metal on all iron ores raised in Ontario and smelted within the province. In the case of pig iron made from foreign ore, Ontario charcoal or fuel as the sole fuel bonus of fifty cents per ton of pig metal is granted, subject to the condition that a certain proportion of native ore is also used.
7. By maintaining a public assay office at Belleville, and aiding milling laboratories for treating and dressing ores at Kingston School of Mines, and the School of Practical Science, Toronto.
8. By maintaining the School of Practical Science, Toronto, and aiding the School of Mining, Kingston, for the training of engineers, chemists, geologists, etc., whose services are so necessary for the proper conduct of the mining industry.
9. By collecting and publishing statistical and other information regarding the mining industry in Ontario, mainly through the report of the report of the Bureau of Mines.

THE DOMINION STEEL COMPANY.—Confidence in this company's future is shown by the fact that for the 30,000 shares of preferred stock recently offered, subscriptions amounting to 88,000 shares were received, coming from both Canadian and American investors.

THE BOUNDARY CREEK DISTRICT, BRITISH COLUMBIA.

Written for the Engineering and Mining Journal by W. M. Brewer.

The Boundary Country, as this mining district is often called, embraces that portion of the Province lying immediately north of the 49th parallel or the International Boundary and westerly from the western boundary of the Trail Mining Division. Its northern boundary is an imaginary line which crosses the Okanogan River at the outlet of the Okanogan Lake, thence westerly to the watershed of Twenty Mile Creek, a tributary of the Similkameen River.

The principal towns in the Boundary Country—Grand Forks, Greenwood and Phoenix—are within 300 miles in a direct course from Vancouver, but with the present railway facilities it is necessary, in order to reach any of these towns, to travel to Revelstoke, 379 miles east from Vancouver; thence to Arrow Head, and take steamer down the Arrow Lakes to Robson, a distance of about 230 miles; thence west about 90 miles by rail on the Columbia & Western Division of the Canadian Pacific Railway, making a total mileage of 699 miles.

The writer recently visited that portion of the Boundary Creek Mining District lying contiguous to the towns referred to, and in which are located the principal mines of the district as well as the newly erected smelters, the Granby at Grand Forks, the British Columbia Copper Company's at Greenwood, and the Standard Pyritic Smelting Company's at Boundary Falls, about 5 miles from Greenwood.

The principal mines in this portion of the district are the Knob Hill, Old Ironsides, Victoria, Mother Lode, Brooklyn, Stemwinder, City of Paris and Humming Bird. Besides these are a large number of mineral claims or prospects; in fact, the entire country from a short distance east of Grand Forks, which is about 2 miles from the International Boundary in a direct course, northerly for about 12 miles, thence westerly about the same distance and southerly to the vicinity of Greenwood, has been pretty thoroughly prospected and staked.

Owing to the heavy snow which covers the ground during the winter season it was impossible to make any thorough reconnoissance of the district with a view of either studying the geology or of examining many of the mines or prospects; consequently, the writer confined his attention to the groups of mines controlled by the Graves Mines Syndicate in the vicinity of the town of Phoenix. These are located on the summit forming the watershed of the Kettle River, at an altitude of 2,900 ft. above the town of Grand Forks, and at a distance from that town as the crow flies of about 12 miles, but by railway 28 miles.

The group of mines consists of the Knob Hill, Old Ironsides, Fourth of July, Victoria, Aetna, Grey Eagle, Tip Top, Banner and Triangle Traction.. The total area covered by these locations is about 300 acres. Although owned by four different companies, the entire group is under one management, and locally known as the Graves-Miner or Granby properties. The Knob Hill and Old Ironsides are the oldest locations, and were staked under the old law each 600 ft. wide by 1,500 ft. long, with extra-lateral rights similar to the law in force in the United States.

All the development work performed at the present time has been confined to the Knob Hill, Old Ironsides, Victoria, Aetna and Grey Eagle. As the ore bodies in the two first-named pitch to the east at an angle of about 55°, much of the development work on the three last-named, which are located to the east from the two first-named, has been done on the ore-bodies which outcrop on the older locations.

Some of the characteristics of the ore bodies are unique. In the first place, the outcrops consist of magnetite carrying low copper values, and a small percentage of lime in the gangue. As depth is attained it has been determined by assay and smelting that the copper values and the percentage of lime increase to such an extent as to render the ore not only of commercial value, but also self-fluxing, while the percentage of sulphur remains so low that no roasting is necessary previous to charging the furnaces, while the average percentage of iron, together with the surface ores, which are practically all iron, is sufficient to form the matte, thus obviating the necessity of adding other iron ore to the smelter charge. The result of this combination decreases the cost of smelting to a minimum, and when it is considered that all the motive power at the smelter is furnished by water it can readily be seen that the problem of treating these low-grade ores has been practically solved.

Unless a geological survey of the surface is made, it is impossible to correctly classify these ore bodies and determine whether they belong to contact deposits or veins, or whether they should be considered as belonging to wide mineralized zones, the mode of deposition of the ore being from replacement. Probably this latter is the most nearly correct hypothesis on which to base the classification. The country rock shows mineralization even beyond the boundary or foot-wall of the ore body, which appears to increase gradually until at a point a few feet from the foot-wall the mineralization has become so strong that pay ore is encountered. The first few feet of the mineralized mass of ore body from the foot-wall carries lean material and apparently less lime than the average ore. The unaltered country on the foot-wall is a purplish-greenish rock, probably an andesite. On the hanging wall or eastern side of the ore body a porphyry dike is said to occur as an intrusive, but nowhere in the workings has this dike been exposed, although on the 300-ft. level of the Old Ironsides a diamond drill has been used to bore toward it, and the writer was informed that about 400 ft. of the ground on that side had been thus prospected, and no porphyry met.

The total development on this group of mines to January 1st, 1901, was 10,053 ft., including shafts, upraises, drifts, crosscuts and winzes. This has been accomplished with 15 air drills.

The shafts numbered 1 and 2 on the Old Ironsides are located close to the center of the claim. From the outcrops the ore bodies are apparently continuous from the Knob Hill on the summit of the mountain through the Old Ironsides located adjoining but lower down the mountain. This will be determined shortly as a drift in the 200-ft. level of the Old Ironsides is being driven to connect with the bottom of the winze sunk from the main tunnel level on the Knob Hill. Should this connection prove that the ore body maintains its continuity, then the stope on the 300-ft. level of the Old Ironsides is 550 ft. below the apex or outcrop on the Knob Hill vertical depth.

The development on the Knob Hill consists of an open cut and main tunnel, the former about 60 ft. wide but not showing limits of ore body on either side. The face or breast of this cut at the time of the writer's visit was 30 ft. high. The output from this cut at that time was 150 tons per day.

The tunnel, about 140 ft. below the floor of the open cut, has been driven across the northeast corner of the claim from near the center of the northern end line a distance of 520 ft., where it intersects the side line, thence along the side line 670 ft. This tunnel is all in ore. At a point 350 ft. in a winze has been sunk 200 ft. deep, the first 150 ft. all in ore; at that point the ore dips away toward the east. A crosscut run from the bottom of the winze toward the east was driven through barren material half the distance. At that point an upraise was made in ore, the ore occurring near the bottom and carried to the top.

Stopes on the adit level were opened on west side of the main tunnel, the first being started 250 ft. from mouth and continued 820 ft. toward the south in a direct line. The width of this stoping ground as blocked out averages 200 ft. No. 1 stope is 200 ft. long by 200 ft. wide. Nos. 2 and 3 stopes have their lengths exposed by drift on east side, with the width determined by crosscuts, but are not drifted on along the west side. All of these stopes are connected. The average vertical height of ore in these stopes is 150 ft. between the adit level and floor of open cut. The two levels are connected with an air shaft started west of No. 1 stope with its mouth at northeast corner of the open cut. This shaft is 140 ft. deep and is used as a chute for dumping ore from open cut to adit level, whence it is trammed to the ore bins on the side track.

At a point 650 ft. from the mouth of the main tunnel a crosscut has been run 180 feet toward the east into the Aetna Claim. This passed through mineralized material, but not sufficiently high-grade to ship. Another crosscut 300 ft. south of first was driven toward the east in ore the first 50 ft., then through mixed material, but apparently ledge matter. A crosscut has also been driven 175 ft. toward the west in ore. The face of this crosscut is apparently the western boundary or foot-wall of the ore body. An air shaft sunk near the face is 192 ft. deep. At a point 163 ft. from the main tunnel in the first crosscut mentioned, a drift has been driven into the Grey Eagle ground and runs 367 ft. The material is all mineralized, but the good ore apparently lies to the west of this drift.

On the Old Ironsides the development has been carried to the 300-ft. level and No. 2 shaft sunk to the 400-ft. No. 1 shaft is vertical and 200 ft. deep. On this level four stopes have been opened, the distance from north to south along them being 700 ft. The shaft was sunk in ore for about 50 ft.; there the ore dipped away from the shaft and the remaining 150 ft. is in country rock. A crosscut was driven from the bottom of the shaft 90 ft., where the foot-wall of the ore body was exposed, and the crosscut continued toward the east 800 ft. About 600 ft. of this distance traverses a portion of the Victoria Claim, which adjoins the Old Ironsides. In this crosscut three ledges of ore were exposed; the first about 100 ft. thick; the second averaging about 80 ft. thick, in the crosscut only showing 50 ft. thick, but widening toward the south; the third ledge is 130 ft. thick; a portion of this ledge, though, is not shipping ore. A drift has been driven on the 200-ft. level along the west boundary or foot-wall a distance of 850 ft. This shows that the boundary waves slightly, and that the ore dips to the east at angles varying from 68° to nearly vertical.

Four crosscuts on the 200-ft. level have exposed blocks of ore of the following widths: 240 ft., 250 ft., 280 ft. and 280 ft. A portion of these blocks had been stoped two sets of timbers or 16 ft. high, at the time of the writer's visit. Two stopes have been started on the Victoria ground on the second ledge, but the full measurement cannot be estimated at present because, while the western boundary or foot-wall had been exposed and drifted along, yet the ore body had not been crosscut to the eastern boundary or hanging wall.

An intermediate level has been opened between the 200 and 300-ft. Ground for stoping 160 ft. by 40 ft. has been blocked out, and the stope carried up one set of timbers or 8 ft. This is the same ore body as in No. 1 stope on the 200-ft. level. This block of ore is shown to be 300 ft. long at least through an upraise to the south, but its full width or thickness is undetermined; the thickness fully exposed will average 45 ft.

No. 2 shaft is 400 ft. deep, but no station had been opened at that level. On the 300-ft. level a crosscut has been driven a total length of 690 ft.; of this 520 ft. is toward the east from the shaft and 170 ft. toward the west. Apparently the same body of ore developed on the 200-ft. level was encountered on the 300 at a distance of 190 ft. east from the shaft, and carried ore to the end of the crosscut. About 20 ft. of the body, though, is not of a shipping grade. An upraise for ventilation from the 300-ft. level to the 200 exposes the third ore body as it dips across the upraise near the top.

From the foregoing detailed description of the underground workings examined by the writer it will be seen that enormous ore reserves have been blocked out, which will aggregate between 3,000,000 and 4,000,000 tons. This is low in grade, and of course the management anticipates the occurrence of lean streaks through portions of the huge masses blocked out ready for stoping. Up to the present time, however, no sorting either at the mine or smelter has been necessary. The same policy as prevails at the Homestake and other big mines, of treating the entire product, has been adopted by the Graves-Miner syndicate as being more economical considering the favorable conditions surrounding the smelter plant, and the characteristics of the ore than would be any system of sorting.

As the smelter plant at Grand Forks was described in detail in the "Engineering and Mining Journal" of December 15th, 1899, the writer has not mentioned it in this article, although he visited it through the courtesy of Mr. Hodge, the superintendent. The fact that the management has decided to increase the capacity 100 per cent. at once, and also to add a converter plant to enable the shipment of blister copper instead of matte, thereby saving the freight on the iron in the matte, would indicate that the operations since the starting up of the plant in September last had been highly satisfactory.

ABSTRACTS OF OFFICIAL REPORTS.

Crow's Nest Pass Coal Company, Limited.

This company's report for the year ending December 31st shows the following balance at the close of the year: Mines and plant, $2,266,017; cash and accounts receivable, $104,507; total assets, $2,370,524. The capital stock is $2,000,000; bills and accounts payable, $181,649; total, $2,181,649, showing a credit balance to profit and loss of $188,875.

The directors' report says: "The net profits for the year, after paying all operating expenses and all charges of every kind at head office and mines, amounted to $141,064. This amount has been derived from the various departments of the company's business, viz., the sale of coal and coke, and from water works, house rentals, general store, etc. As no dividend was paid for the year on the company's capital, the above sum has been carried forward to credit of profit and loss, making a total sum at credit of that account (including the amount already there from the earnings of 1899) of $188,875.

"The coal produced during 1900 amounted to 220,458 tons. Of this tonnage, 114,063 tons were sent to the company's coke ovens at Fernie, and produced 73,496 tons of coke, while the balance of 106,395 tons was disposed of as merchantable coal. During the year the company paid out in cash the sum of $874,081, of which the payrolls amounted to $419,037, the balance of $454,944 having been disbursed for new coke ovens, additions to plant and for development work at Fernie and Michel. One hundred and ten new coke ovens were built in 1900, which makes, with the 202 in operation at the end of 1899, a total of 312 ovens, with a capacity of over 450 tons of coke per day. The number of men at present in the company's employ is about 800, and this number will, of course, steadily increase as our mines are developed."

At the annual meeting in Toronto, March 1st, President George A. Cox made an address, some extracts from which are given below: "It affords me great pleasure to announce that we are prepared to proceed at once with construction and development work, involving an immediate expenditure of $835,000, and we already have this money in the treasury of the company for this purpose. This large sum does not include the railway project, to which I will refer later, but will be devoted exclusively to development work, the building of coke ovens, dwellings, offices and other works in connection with the coal and coke industry of the company. We intend to build at Fernie, Michel and at another suitable point, 720 coke ovens, which will involve an expenditure of $540,000 under this head alone. We will then have 1,032 ovens, which will increase our capacity for coke production from over 450 tons per day, as at present, to more than 1,500 tons per day. Our expenditure will also include more than a quarter of a million dollars on mine improvements, offices and miners' dwellings.

"There is a prospective demand, provided we obtain access to the American market, as I shall hereafter mention, for 4,500 tons of coal per day within a year, and in three years we expect to increase our output to about 6,000 tons of coal per day, a large portion of which will be converted into coke in our ovens, and within five years we expect to have a pay roll of fully $10,000 per day, which will be sufficient to maintain three important industrial centers in the coal district.

"It is only fair to state that the present demand of British Columbia for coal and coke would not justify any such expenditure as we propose to make. This is self-evident when I state that the present demand of British Columbia does not exceed 1,000 tons of coal and coke per day, and we cannot expect this demand to increase in the near future, even under most favorable conditions, so as to justify such expenditures. In order that we may proceed with this development it will be absolutely necessary to secure access to the American markets by a route that will put us in a position to successfully compete with the coal and coke producers already in the field. Recognizing, therefore, the necessity of obtaining direct access to the adjacent markets of the United States, an application has been made to Parliament by five of your directors for a charter to build a railway from the coal fields to the boundary, where it is intended to connect with a spur line from Jennings on the Great Northern Railway.

"The fear has been expressed in some quarters that the establishment of railway connection between the Crow's Nest coal-fields and the Great Northern Railway system will deprive the Canadian mining and smelting industries of a supply of coal and coke, and that the company may create a shortage in the Canadian supply to benefit American smelting interests. These fears are groundless. From geological reports it appears that there are over 250,000 acres of coal lands in the Crow's Nest country, containing a supply of coal which is conceded by all authorities to be practically exhaustless, entirely independent of the immense coal areas in Alberta and in other parts of British Columbia.

"We are at present prepared to enter into time contracts with the smelters of British Columbia to supply any quantities of coal or coke they may require; but so far as the local supply is concerned, its safety can be best assured by such development of the Crow's Nest mines as will be made possible by the building of the proposed line. . . .

"In addition to the development of the coal and coke industry, the proposed railway will open up a prospect, and an assured prospect, of smelting development which will prove, from a public standpoint, of the very greatest importance. The success of the smelting industry depends upon the ability to assemble the various materials essential to profitable smelting at the lowest possible cost, and if the proposed line of railway is built connecting the Crow's Nest fields with the American railway systems, the balance of advantage will be decidedly in favor of the Canadian side, as the place for establishing a large and profitable smelting industry. The Canadian people have but to improve their opportunity, to stand out of the way and let the good fortune in. In order to illustrate what I have said, permit me to point out how suitable a place Fernie, or some point adjacent thereto, would be for the establishment of a smelting industry. There we have the coke, without any charge for hauling, while to carry it to any smelting point south of the line would involve a hauling charge, as well as an American duty of 60c. per ton. The limestone required is to be found at Fernie, with no expense, except the cost of quarrying. The lead ores of Southern British Columbia are now seeking a market, which it is almost impossible for them to find, and those adjacent to the coal-fields could, at a trifling cost for transportation, be laid down at Fernie, or some other convenient point. The dry ores necessary to make workable and profitable mixtures and blends are not at present to be obtained in British Columbia, but are to be found through the adjacent mining States along the lines and connections of the Great Northern and Northern Pacific railways; and the ore cars taking the coal and coke from the mines at Fernie to supply the railways and established industries in these States, instead of coming back empty, would, at a low cost for transportation, bring back these dry ores to such a smelter. There is no point south of the boundary line where a smelting industry could so easily or so profitably be established. If a smelting industry were established south of the line there would be, as above mentioned, the cost of transportation of the coke to the site of the smelting industry; the duty on this coke entering the United States; the cost of transporting the lead ores from British Columbia to the site of the proposed smelter, and the American duty on the lead ores entering the United States, which, upon the quality of ore found in some of the best mines in British Columbia would probably be about $9 per ton. Simply on the item of transportation there would be the serious handicap of the ore cars bringing down the coke and the ore from British Columbia to a smelter on the American side being compelled to return empty, and this would necessarily entail a proportionately higher freight rate.

"Not the least important factor in the situation is the fear in the minds of American capitalists interested in the mining industry of the West, that an export duty may be put upon ores by the Canadian Government, and this would cripple any smelting industry established on the American side dependent upon Canadian ores as its source of supply. That this is not simply theory, but the mature judgment of practical smelting men, is evidenced by the fact that we have the most positive assurances from a smelting man of large capital and experience that if we obtain the proposed railway connection he will at once commence the erection of a large smelting plant in British Columbia, adjacent to the coal-fields; and we have assurances scarcely less definite from others of the establishment of three or four more smelting industries at other suitable points in Southern British Columbia, provided the proposed road is built.

"The prospect, therefore, for Southern British Columbia would appear to be exceedingly bright. Once the charter for the railway is assured, the construction of the coke ovens, the building of the homes for the miners and the virtual establishment of two new towns in Southern British Columbia will await only the opening of the season. Scarce more time will elapse, from the assurances we now have, before more than one large smelting industry will be put under way, and hundreds of thousands of dollars will be invested in developing this important industry in that country. With improved transportation facilities, as well as the improved smelting facilities which would be secured, a smelter could secure freight charges and give rates for treatment that are now impossible."

THE BELMONT GOLD MINE, ONTARIO.

The Belmont Gold Mine, situated 8 miles northwest of Marmora, has been worked during the past three years by the Cordova Exploration Company, under the management of Mr. D. G. Kerr. The mine has been thoroughly explored and developed, the ore being treated by a 10-stamp mill. The company has just completed enlarging the mill to 30 stamps and making other changes, an excellent description of which is given by the Peterborough "Review," substantially as follows:

The new mill is 175 ft. long, 90 ft. wide, and 85 ft. from lowest to highest point. It is substantially built, neatly finished and painted, and well lighted. The 30 stamps are driven by a Corliss engine of 150 H. P. The engine and shaft have been put in strong enough to extend the mill and drive 120 stamps if necessary. Pulleys on main shaft to drive stamps are equipped with friction clutches, so that 10 stamps can be hung up completely without slowing the engine. From the side of the engine is a 6-ft. driving pulley up to stone breaker counter shaft. Crushers are two, one 10 by 20 and a smaller one 7 by 10. The mill in this part has ore bin capacity of 600 tons.

The crushed ore, on leaving the mortar boxes, flows over plates 36 ft. long, having a series of 10 drops. From there it passes over 6 Wilfley tables, driven by a separate engine, which has a capacity for double that number.

Below this floor is the new cyanide plant. It consists of 3 large circular steel leeching vats, 15 ft. in diameter and 4 ft. deep. Below these are 2 circular steel tanks, 7 by 2 ft., and further below are zinc boxes where the gold is precipitated. Below these are two sump tanks 9 by 4 ft., and also 3 wooden acid tanks, on this floor. Above the leaching vats are 2 other steel tanks 10 by 5, used for storage. This is the first cyanide plant ever used in this district. The cyanide plant is in charge of W. H. Whytock, who spent 5 years in the Rose Deep Mine in South Africa. The stamps and tanks were manufactured by the Wm. Hamilton Company, of Peterborough.

The engine and boiler house attached to the mill is 80 by 40 ft., with a hallway 6 ft. wide through the center to enter the mill. The engine room on northwest side is substantially built with 18-ft. ceiling, and contains the Corliss engine already mentioned. The old mill engine is used for driving the dynamos for electric lighting. The boiler house contains 2 horizontal tubular boilers, set in brick with space for a third. There are the usual feed pumps, with National Heater to heat water by exhaust steam.

Electric current for lighting is generated by 2 dynamos, driven from counter shaft by clutches. One generates current for the day when light is used in the mine and the other for night. It is a three-wire system, this being preferred for its convenience, safety in mine, and for better insurance rates. There are abundant lights throughout the mine, shafts, mills, shops, office, manager's residence, store, boarding house for the staff, etc. A large arc light over No. 1 shaft keeps the whole surroundings of the mine constantly moonlight, as it were.

Behind the mill is a large tank house 112 by 20 by 20, connected with

the mill by a passage. It contains 7 large water tanks 15 ft. in diameter, 12 ft. deep, with capacity to hold 75,000 gallons. The water supply comes from No. 1 shaft.

The assay office consists of a brick building in two parts 20 by 28 and 20 by 20 ft. The larger part contains a sample grinding room, where will be installed a motor sample grinder stone breaker, underneath the floor of which is a 20 by 20 cellar for coke, and a furnace room 20 by 18, equipped with combined gasoline furnace and muffle. The other part consists of a laboratory, 20 by 20, an office 10 by 10, and a balance room. The building is heated by furnace.

Several additional machines have been added to the machine shop. It is fitted up with a large turning lathe, 6-ft. planing machine, 2 drill machines, pipe cutting and screwing machine and bolt screwing machine, driven by a small air engine. This, together with the three blacksmith shops, on the mine, enables them to make and repair any part of the machinery.

The air compressor is a frame building 140 by 60 ft. and contains a cross-compound air compressor with intercooler and aftercooler condenser, 185 H. P., with air receivers and air line from air receiver to the various shafts; 2 return tubular boilers in separate rooms with electric damper regulators, large water tank, 7,000 gallons capacity, for coolers.

At the mine there are 10 shafts, the deepest being down 400 ft. No. 2 is down 185 ft. and No. 3 is 250 ft. None of the others is yet over 100 ft. A large amount of drifting and cross-cutting has been done.

The property consists of 425 acres at the mine, 300 of which is in the township of Belmont and 125 acres in Marmora. At Deer Lake the company has 160 acres also.

The company owns a most admirable water-power at Deer Lake, a distance of 2½ miles from the mine. Two dams have been built at the foot of the lake. The large dam is 80 ft. long, 12 ft. high, 13 ft. thick at base and 5 ft. at top. It is built of concrete and cement masonry. The other dam has a timber slide 20 ft. wide for use of lumbermen, and also a sluice gate to admit water to flume pipe 7 ft. square. It is contemplated to instal a large air compressor and bring air to the mine through a 10-in. wrought iron pipe, which will then supply power for the whole mine. Manager D. G. Kerr's plant is to have ample stamp capacity in his mill and power cheap enough that the lowest grade ores can be thoroughly treated at a low cost.

A tramway has been built, commencing at the level of the top of the mill. Ore is hauled along this tramway (level with top of mill) in cars containing 10 tons, by one horse. This tramway forms a perfect circuit for collecting the ore from all the shafts.

MINERAL INDUSTRY OF BRITISH COLUMBIA.

Written for the Engineering and Mining Journal by W. M. Brewer.

(Continued from Canadian Supplement for February.)

Golden.

This district embraces the most easterly mining district in the Province, and is locally known as East Kootenay.

The district is bounded on the south by the International boundary, on the east by the eastern slope of the Rocky Mountains, on the north by that portion of the Cariboo District lying between the Big Bend of the Columbia River and eastern boundary of the Province, and on the west by the height of land forming the watershed between the East and West Kootenay watersheds. While considerable prospecting has been done in the northern portion of the district, yet the Windermere and Fort Steel divisions, which form the center and southern portion of the district, have received much more attention from both prospectors and capitalists, and to-day contain the only producing mines in the entire Golden Mining District.

The Fort Steel Division was brought into prominence some years back by the placer gold taken from Wild Horse Creek, and it is only since 1896 that much attention has been given to prospecting for lode mines. The results have been very favorable inasmuch as two of the largest producers in the Province are located in this division. These are the North Star and San Eugene silver-lead mines. The North Star first shipped ore in 1896, the San Eugene in 1898. During the past year both of these properties have ranked among the heaviest producers in the Province of concentrates, which are to-day being shipped to the Guggenheim smelters, in Chile, a contract having been made for the shipment of a very large tonnage of concentrates during the next few months.

Of course the fact that this district only secured railroad transportation in 1899 through the building of the Crow's Nest Pass branch of the Canadian Pacific Railway, is responsible for the lack of progress previous to that time. Its recent progress is due to the opening up of the coal deposits in Crow's Nest Pass. The collieries and coke ovens situated near Fernie are furnishing the interior of British Columbia as well as the Canadian Pacific Railway and the territory along its lines east of the Rocky Mountains with a high grade of coal and coke. The extent of these coal fields is enormous; the measures extend north and south a distance of about 40 miles and east and west about 10 miles from Elk River toward the boundary line between Alberta and British Columbia. Geologists report upward of fifty seams of workable coal, varying in thickness from 4 to 30 ft..

The Windermere Division of the Golden District has probably not attracted as much attention during the past year as it did during 1899. The inaccessibility of this district and the extreme height at which the best prospects are located, almost always several hundred feet above timber line, the precipitous mountain sides and numerous snow slides, have been the principal reasons retarding the progress of this division.

The most prominent mining proposition located within its boundary is the Delphine mineral claim, on the north fork of Toby Creek. Several carloads of galena ore, carrying as high as 200 oz. in silver, have already been shipped from this property, but when it is considered that the cost of transporting this ore from the mine to the Columbia River by pack animals, averaged about $40 per ton, and the cost of shipment and treatment from Athelmar to the Trail Smelter via the Columbia River to Golden, thence by rail and lake steamers to Trail about $20 per ton, it is easily understood that economical management would consider shipment under present conditions unadvisable.

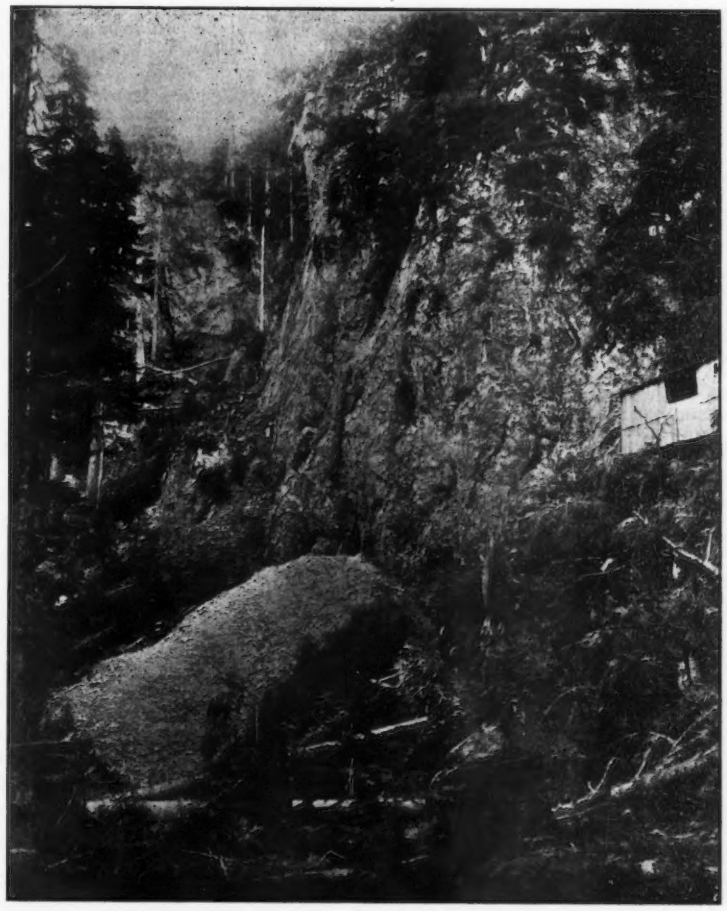
During the past year considerable development work has been performed on the various mineral claims located in this division, the most prominent among them being the Mineral King, on Toby Creek; the Pretty Girl, Red Line and Sitting Bull groups, on Horse Thief Creek.

Until cheaper transportation is furnished from the mines to the Columbia River at least, the progress of this division must necessarily be slow, because capitalists do not consider it advisable to invest money in districts where it is evident that they will have to wait three or four years at least for railroad connection and cheap transportation.

Revelstoke.

This district includes the country contiguous to the Columbia River from the Big Bend on the north, to Upper Arrow Lake on the south, together with what is known as the Lardeau and Trout Lake camps. The Big Bend country has received but comparatively little attention during the past year, the owners of mineral claims in that section preferring to wait until the completion of the wagon road which is now under construction, to enable them to get supplies into the country and transport ore out at reasonable rates for transportation.

In the Lardeau and Trout Lake camps mine owners are awaiting snow



MAMMOTH OUTCROP, BRITANNIA GROUP, B. C.

to enable them to raw-hide ore to Arrow Lake for shipment to the smelter. There is some probability that a railroad will be built into these camps in the near future, a party of surveyors having recently been employed in cross-sectioning a line of road which has already been surveyed. It is expected that the following-named properties will ship ore during the coming winter: Netty L., Silver Cup, Towser, Sunset Group and the Old Gold Group. Although a large number of mineral locations have been made in these camps and assessment work recorded yearly on about 650 mineral claims, yet owing to inaccessibility but comparatively little is known of the possibilities of the camps by the average outsider.

(To be Continued.)

Production and sales of Nova Scotia coal showed a large increase last year, the activity in the mines having been unprecedented. The total output is given as below in the annual report of the Mines Department:

	1899.	1900.	Increase.	Per ct.
Production at mines	2,642,333	3,238,345	596,012	22.6
Sales	2,419,137	2,997,546	578,409	23.9

The operations of the Dominion Coal Company in Cape Breton show the largest single advance, but account for only a little over one-half the increase. Nearly all the gain in sales was in coal for export to the United States, shipments of that class having reached a total of 624,273 tons, as compared with 153,188 tons in 1899; the increase being 471,085 tons. Most of this was in coal for the use of the New England Gas and Coke Company at its plant near Boston. The prosperity of the Nova Scotia coal mines promises to continue and the conditions are very encouraging.

PERSONAL.

Mr. J. A. Macdonald, solicitor for the Miner-Graves Syndicate, of Rossland, which controls the Granby Smelter at Grand Forks, B. C., has been in Victoria.

INDUSTRIAL NOTES.

The Laurie Engine Company, of Montreal, Que., is building 5 large blowing engines for the Dominion Iron and Steel Company, of Sydney, N. S. The 2 largest pieces are cylinders 9 ft. in diameter and weighing 30 to 35 tons, together with several large castings weighing 20 to 25 tons. Nearly all the contract has been completed and most of it shipped.

The partnership existing between Mrs. S. W. Harrison, Mr. F. G. Rowe, Mr. R. De Mesle, of Montreal, Que., under the firm name of Hearn & Harrison, having been dissolved and liquidated on account of the death of Mrs. S. W. Harrison, and the 2 remaining active partners, Mr. F. G. Rowe and R. De Mesle having bought the interest of the deceased, will still continue the business under the name of Hearn & Harrison, at the old address, 1640-1642 Notre Dame Street.

At the recent annual meeting of the Nova Scotia Steel Company, Limited, the financial statement showed profits amounting to $665,273. When the balance of the credit of profit and loss, $47,884, is added, it gives a total of $703,156. The dividends fixed were 4% on preferred and 10% on common stock. On the new board of directors Thomas Cartley, secretary of the company, and S. A. Fraser, of New Glasgow, took the places of H. S. Poole and John MacNab, of Halifax.

The Dominion Iron and Steel Company, Limited, has offered at $85 and earned dividends, $3,000,000 of 7% cumulative preferred stock out of a total issue of $5,000,000 subject to be called in by the company at $115 and accrued dividends. The company has a first mortgage of $8,000,000 of 5% gold bonds and $15,000,000 common stock. The announcement makes the statement that if the production from the company's works be as estimated, 300,000 tons of pig metal and 60,000 tons of steel blooms in 1901, and thereafter 400,000 tons of iron and steel per annum, made from foreign (Newfoundland) ore, the bounties to be received from the Canadian Government will be as follows: 1901, $870,000; 1902, $2,075,000; 1903, $1,850,000; 1904, $1,450,000; 1905, $1,000,000; 1906, $635,000; 1907, $225,000; total, seven years, $8,095,000.

At the annual meeting of the Canadian General Electric Company in Toronto the report showed that the net profits on operating accounts amounted to $262,903, and the premium on the new stock to $75,000, these items, with the $58,437 balance from last year, making a total of $396,340. The dividends, 10% on the common stock and 6% on the preferred stock, amounted to $127,623. $125,000 has been added to reserve, making that fund now $265,000 and a further sum of $12,601 has been placed at the credit of profit and loss, making $71,038 carried forward. The prospects for the new year, it was stated, were better than ever before. Directors were re-elected as follows: W. R. Brock, president; H. P. Dwight, first vice-president; Frederick Nicholls, second vice-president and managing director.

The Gates Iron Works, of Chicago, Ill., has sold the Granby Mining and Smelting Company, of Grand Forks, B. C., a copper smelting and converting plant, this being a second order from the same concern. This order completes one of the largest copper smelting and refining plants built in the United States or Canada. The initial plant consisted of 2 rectangular water-jacketed furnaces, 44 by 160 in., with all the necessary appurtenances, to handle grade copper ores, and was designed to handle 500 tons per day. Under the direction of the superintendent, Mr. A. B. W. Hodges, the plant has averaged 600 tons per day, and has reached as high as 763 tons. The Granby Company has completed smelting its first 100,000 tons, and has made a new record for low cost of mining and smelting.

To complete its plant, the Granby people have ordered 2 more water-jacketed furnaces, 44 by 160 in., a complete ore-crushing and sampling works, with No. 5 style D crusher, one 9 by 15-in. Blake crusher, one F Gates crusher, one sample grinder, 3 sets of rolls, elevators, etc.; a complete silica crushing mill, including a Dodge crusher, dry pans, rolls, elevators, etc., and the following converting machinery; one tilting reverberatory furnace complete, one converter stand complete, cars, a complete hydraulic system, blowing engine, one 10-ton electric crane, one 40-ton electric crane, with everything necessary to a perfect plant. The Granby Smelting and Refining Company has great ore reserves and is working over 2 miles of development; the production of over 1,200 tons of ore per day is well within the possibilities of the mine. The water-power plant, which cost $100,000, not only furnishes the power for the smelting and converting plant, but also electric power for the city of Grand Forks.

GENERAL MINING NEWS.

BRITISH COLUMBIA.

(From Our Special Correspondent.)

The mines in the Kootenay and Yale Districts are at present served by the following smelters: The Trail Smelter, with 1,000 tons daily capacity; the Granby Smelter at Grand Forks, 600 tons daily; the British Columbia Copper Company's plant at Greenwood, to have a capacity of 1,000 tons daily; the Hall Mines Smelter at Nelson and the Le Roi plant at Northport, Wash., just over the international line, with a capacity of 1,250 tons per diem. In the list also must be mentioned the new pyritic smelter at Greenwood, now in course of construction. The City of Kaslo has offered a bonus for the erection of a smelting plant there for silver-lead ores and as the Dominion Government has favorably received the request of the mine owners to grant a bonus per ton on silver-lead ore smelted in Canada, the erection of a smelter at Kaslo is extremely probable.

Atlin District.

Coast & Kootenai Railway.—Mann & Mackenzie have a party of surveyors in the field, headed by G. G. McCarthy, of Toronto. According to a local paper the western terminal will be Vancouver. The route will extend through the valley of the Fraser River, scale the Hope Mountains, traverse the Similkameen and Okanogan Districts and a portion of the Boundary District. Both Cascade and Midway, points in the Boundary District on the international frontier, have been mentioned as the probable eastern terminal.

Great Northern surveyors have already surveyed a line from Marcus, on the Spokane Falls & Northern, up the water grade of the Kettle River through the Colville reservation to Nelson, Wash., a point 4½ miles from Grand Forks. The survey also touches a point on the frontier, 12 miles east, at Cascade, B. C. If the Great Northern does not build further west than Cascade or Nelson, Mann & Mackenzie will have to cross the divide between Boundary Creek and Fourth of July Creek. Hill, however, would have no difficulty in extending his line further west from Nelson by following the water grade of the main Kettle River entirely through American territory to Midway, B. C.

Stevendyke.—This hydraulic property on Pine Creek, ½ mile below Discovery, comprises about 500 acres of placer ground and a water right of 2,000 in. from Pine Creek. Messrs. Frank Weir, D. Todd Lees and W. M. Brook are the owners. A ditch capable of carrying 500 in. was built for 1½ miles last year jointly by this concern and the Sunrise Company.

Boundary District.

(From an Occasional Correspondent.)

The Miner-Graves Syndicate, operating the Old Ironsides, Knob Hill, Victoria and other mines at Phoenix, has installed a water heater manufactured by the Stillwell-Bierce Manufacturing Company, of Dayton, O. It has a capacity of supplying water for 500 H. P. The mine water is pumped directly from the Old Ironsides shaft to the top of the heater, where it runs over a series of iron pans, separating the lime and other objectionable impurities.

British Columbia Copper Company.—The first shipment of copper matte ever sent from the Boundary Creek section of the Boundary District was made March 4th by this company, of New York City. This company owns the Mother Lode Mine, near Greenwood, one of the best copper mines in the district. It also has its own smelter at that town. The furnace was blown in on February 18th and to date about 175 tons of matte have been produced, the grade of which has been gradually improved until now it is up to 50% copper. Between 300 and 400 tons of practically self-fluxing ore are being run through the furnace every 24 hours.

Dominion Copper Company, Limited.—This company, operating the Brooklyn, Stemwinder, Idaho and Standard mines at Phenix, has ordered a new plant, to cost about $20,000. The contract for the air compressor and drill equipment was let to the James Cooper Manufacturing Company, of Montreal, Que. The air compressor is to be an Ingersoll-Sergeant Corliss cross-compound machine with steam cylinders 18 in. by 34 in., and a 36-in. stroke. The rating is 20 drills. The contract also calls for 10 Ingersoll-Sergeant 3¼-in. drills, 10 double-screw columns and lengths of air hose, one air receiver 54 in. by 12 ft. long, and one 200-H.-P. feed-water heater. A further contract was made for the immediate equipment of the Stemwinder property with a straight-line Ingersoll-Sergeant 5-drill compressor plant, one 60-H.-P. locomotive boiler, one air receiver 42 in. in diameter and 8 ft. long, one Bullock diamond drill, with 1,000 ft. of rods, one boiler feed pump and a quantity of supplies. Besides this order to the James Cooper Manufacturing Company, the Bradley Engineering Company, of Spokane, Wash., has a contract for one 80-H.-P. hoisting engine, one 50-H.-P. hoisting engine made by the Ottumwa, Ia., Iron Works, 2 skips of 1 ton and 1½ tons capacity, respectively, and 4 80-H.-P. boilers. Work has started on the new double-compartment shaft on the Idaho.

Snowshoe.—At this mine, owned by the British Columbia (Rossland & Slocan) Syndicate, Limited, the work of the diamond drill is progressing very satisfactorily. The ore bodies are now being exploited from the face of the Railroad tunnel. Over 400 ft. of drilling was done in the main shaft.

Victoria.—The work of cutting down timber and clearing the ground for the 4-compartment shaft to be sunk on this shaft, is being pushed vigorously.

Cariboo District.

Slough Creek Company.—This company owns hydraulic claims on Slough and Williams Creeks, 5 miles from Stanley and 12 miles from Barkerville. A shaft has been sunk 370 ft. and a tunnel started from the bottom toward the center of the old Slough Creek channel. The distance to reach pay dirt is 1,060 ft., of which 413 ft. have been tunneled. The tunnel is 9 ft. wide by 7, and the work progresses at the rate of 5½ ft. per day, so that the manager expects to reach the pay dirt in June. Twenty-eight men are now working in 3 shifts. The company has considerable machinery on the property, and water rights from Jack Club Lake and the Slough.

The operating company was formerly the Incorporated Exploration Company, of British Columbia, which went into liquidation last year and has been reconstructed as above. Mr. W. A. Bennett, the liquidator, states that the capital of the new company is £200,000, divided into 200,000 shares of £1 each. The reconstruction was completed in London last December and the American and British Columbia shareholders were given till February 10th to make application for the new shares, but the time is extended. The shareholders of the Slough Creek Mining Company, of Tacoma, Wash., which was absorbed by the Incorporated Exploration Company 3 years ago, are also involved in this reconstruction. J. Hopp is local manager.

East Kootenay District.

Paradise.—This mine in the Windermere District is working 22 men. Forty-seven horses have been rawhiding the ore down the mountain and 9 teams hauling it to the river. The ore house, 100 by 16 ft., is said to contain between 3,000 and 4,000 tons. Another ore house 200 by 20 ft. is completed and contains a considerable amount of ore.

Lillooet District.

Development work on the Alhambra is to be pushed at once. Several men under Mr. A. Richey left this week to commence work on this claim.

Ample.—Colonel Rivers, superintendent of the Toronto-Lillooet Gold Reefs Company, reports that the mill is ready again. As soon as the weather moderates it will start grinding.

The Brett Brothers are also engaged taking out ore and putting things in shape for the starting of their mill in the Spring. Some very rich ore has been struck and the mine looks well.

Anderson Lake Mining and Milling Company.—This company has a 10-stamp mill and tramway at the Anderson Lake mines on McGillivaray Creek, about 35 miles from Lillooet. The property consists of 4 claims, the locators being the Brett Bros. and Mr. John Marshall, of Lillooet, who, with others, is heavily interested. It is a gold quartz proposition. The main ledge averages about 10 ft. in width. Three tunnels have been driven on the various ledges. The longest tunnel is in about 500 ft. and is said to be in ore all the way. Considerable cross-cutting has been done and upraises made. The company recently decided to erect an additional 10 stamps.

Ben d'Or.—About 12 men are getting out ore for the coming season and the mine is showing up well.

Lorne.—F. M. Bard, of Nelson, is erecting a 5-stamp mill on this group on Calwallader River about 70 miles west of Lillooet. The property is operated by the Mines Eploration, Limited, the managing director being Leslie Hill, of Vancouver. It produces gold. About 12 men have been at work all winter.

West Kootenay District.

The property owners of Kaslo have voted to grant $50,000 bonus and exemption from taxation for 10 years for a proposed smelter. These privileges are open to the first company which fulfills the conditions, the work on construction to start by October 1st next.

Slocan Ore Shipments.—The total amount of ore shipped from the Slocan and Slocan City mining divisions for the year 1900 was, approximately, 35,000 tons. Since January 1st to March 2d, 1901, the shipments are given as follows: Payne, 1,172 tons; Last Chance, 365; Slocan Star, 160; Ruth, 215; Bosun, 160; Hewett, 450; American Boy, 239; Ivanhoe, 361; Trade Dollar, 84; Sovereign, 108; Wonderful, 4; Arlington, 660; Two Friends, 40; Enterprise, 120; Hartney, 80; Black Prince, 60; Goodenough, 70; Miller Creek, 20; Reco, 38; Sunset, 21; Queen Bess, 367; Monitor, 222; Corinth, 64; Bondholder, 20; Rambler, 150; Surprise, 20; Kaslo Group, 10; Chapleau, 15; Speculator, 10; total, 5,105 tons.

Black Warrior.—This group is situated on the head of McDonald Creek, 9 miles from Ferguson. There are 4 claims in this group. The ledge lies in a wide belt of slate. A considerable portion of the ledge has been stripped and a chute of ore has been uncovered of from 2½ to 3 ft. wide. The ore consists of galena and is said to run 150 oz. in silver, $8 in gold and 50% lead. Thos. Horn, the owner, has a tunnel in about 210 ft.

British American Corporation.—The local officials of this company have been notified that their services will not be needed after April 1st, but they will all be re-engaged as officials of the Rossland Great Western. The change is due to the voluntary winding up of the British American Corporation in London. It floated the Le Roi, Le Roi No. 2, Rossland Great Western and Kootenay mines, which will now stand on their own merits. The officials in Rossland concerned are General Manager Bernard Macdonald and his assistants.

Bosun.—A body of ore was cut recently in the lower tunnel of this Nelson mine at a depth of 600 ft. The mouth of the new tunnel is but a short distance from transportation on Slocan Lake. About 40 men are employed under W. H. A. Sandiford, general manager. Shipments are 140 tons monthly.

Dandanelles.—The directors and shareholders of this company were to meet at Sandon on March 23d to consider the question of selling the claim and all assets to pay off liabilities, and to recapitalize under the name of the Dardanelles & Okanagan, with a capital of $150,000.

Eclipse.—This claim, on Fish Creek, is reported showing up well. It is being operated by H. Jackson, of Rossland, but is controlled by American capital. About 10 men are engaged. The ore is a silver-lead and gives assay values of about $80 per ton.

Great Northern.—A. B. Clabon, of Rossland, representing Eastern Ontario capitalists, has an option for 6 months on this group of 6 claims north of Trout Lake. It is the intention of Mr. Clabon to commence work with a full force on the main shoot, sinking a shaft. The work done on this group, which comprises 6 claims, consists of about 258 ft. of tunnel on the vein. The ore carries large quantities of iron and copper, besides the galena.

Highland.—This mill at Ainsworth was built for a 200-ton mill and machinery installed for 100 tons, and arranged so that additional machinery could be put in at any time. Though equipped for 100 tons, it is putting through from 125 to 130 tons of ore. Working one shift in the first 19 days' run the mill produced 225 tons of clean concentrates. It is connected with the mine by a single rope tramway and with the wharf, which belongs to the company, by a gravity tramway, and is able to load directly onto barges from their ore bins. The machinery consists of 1 Gates crusher, 3 sets of rolls, 5 trummels, 7 jigs and 6 Wilfley tables, all driven by water power.

Ivanhoe.—This Nelson mill shipped 15 cars of concentrates to the Hall Mines Smelter in 3 weeks recently. The water supply is good. The concentrator's capacity at present is something like 150 tons a day.

Northwest Mining Syndicate.—This is the parent company of that operating the Bosun Mine. It is operating the Lakeview group of 5 claims, upon which considerable development has been done. This company also owns the Condor Group of 17 claims, situated at the head of Four Mile Creek.

Onondaga Mining Company.—This company, organized by the Will Brothers, of Syracuse, N. Y., has made a second payment on a group of 4 claims 7 miles from Waterloo to the vendors, Messrs. J. M. and C. B. Etner and J. and D. Cromie. The balance yet due is to be paid in 60 days. The Onondaga Company recently bought a 10-stamp mill which is now being erected near the mine. About 35 men are employed.

Sunset.—J. C. Drewry, of Rossland, is managing director of the Canadian Goldfields Syndicate, which owns this group, situated near Whitewater. It is shipping ore to the Hall Mines smelter. The mine is looking well and a large body of ore is in sight.

Tamarac.—The tramway connecting this mine with the Nelson & Fort Sheppard Railway is completed. A siding has been built at one end of the tramway and ore bins at the other. Shipments will begin to Silica as soon as the management is ready to receive it. The ore will be received there as soon as the weather becomes warm enough to thaw out the water pipes in the cyaniding mill.

Tammany Gold Mines Company.—Bert Rea recently sold the controlling interest of the capital stock of this company to men in Saginaw, Mich. Besides paying for the controlling interest, a large sum was put into the treasury for development purposes. Work will be resumed on the promising group, which consists of 4 full claims and 4 fractions. The ore carries gold, silver and copper. The group is located about 2 miles from Coryell Station on the line of the Canadian Pacific, thus affording easy means of transportation to the smelter. The control of the stock was owned by Messrs. Hector McPherson, George Green, J. P. Paxton and Bert Rea, of Rossland.

True Blue Copper Mines, Limited.—This company has an authorized capital of $150,000 in 10c. shares. The Canadian Gold Fields purchased 350,000 of the original owner's shares and the first 50,000 shares of the treasury stock, and is preparing to work the property.

(From Our Special Correspondent.)

From present indications there will be no labor troubles in the Kootenay country this year, and the immediate future for mining is of great promise.

The ore shipments from Rossland are steadily increasing notwithstanding that the LeRoi smelter at Northport is unable to take all the ore that the mines can now send.

The week ending March 10th made a new record for the output, 8,591 tons being shipped. On the 4th, 1,790 tons were sent down to the local smelters. This is the record for any one day.

The shipments in detail for the year to March 10th, are as follows: Le Roi, 34,675 tons; center Star, 21,236 tons; War Eagle, 6,744 tons; Le-Roi No. 2, 2,970 tons; Iron Mask, 1,240 tons; Great Western, 1,072 tons. The Velvet, I. X. L., Evening Star, Spitzie Giant and Portland combined, 800 tons; total, 68,734 tons. The corrected shipments for February were 26,728 tons.

There are at present some 35 working properties in and around Rossland. Many other properties extensively developed are at present closed down awaiting a settlement of the smelter question, but the outlook for the coming spring and summer is unusually bright.

Rossland Mines Output in 1900.—The annual report of the minister of mines, shortly to be issued, will contain the following production figures from Trail Creek District for 1900: LeRoi, 150,734 tons; LeRoi No. 2, 3,013 tons; War Eagle, 9,866 tons; Center Star, 40,875 tons; Iron Mask, 2,765 tons; Evening Star, 348 tons; Giant, 506 tons; I. X. L., 500 tons; Spityre, 155 tons; Monte Christo, 273 tons; Iron Colt, 80 tons; total dry tons, 218,135; gross value, $2,333,125. Twenty-nine working claims are described in the report. The average pay-roll of the camp runs from $155,000 to $175,000 per month, including assessment work. The number of men employed shows a healthy increase over the previous year.

Athabasca Gold Mine, Limited.—The annual report covering the work on this Nelson mine to January 1st, 1901, gives the product for the year as $170,668, obtained from 5,054 tons of ore. the profit being $29,551. The cost of mining is still high. In development 1,921 ft. was done at a cost of $29,014, or $15.10 per foot. The milling cost was $14.97. Ore and waste mined, 28,176 tons. Cost per ton, $2.69. Total cost of development was $29,014; and of extraction, $75,712, making a total of $104,726. The net profit in 1899 was $31,500.

Center Star.—The company has announced the 5th dividend of 1c., or $35,000, payable April 1st, making $175,000 paid by the new company to the date mentioned. About 2,500 tons are shipped weekly to the Trail Smelter and this amout is likely to be increased.

Great Western Mines.—The new 40-drill compressor supplied by the Canadian-Rand Drill Company, of Sherbrooke, Que., is nearly in place and should be working by April 1st. The new plant will be operated by electric power supplied by the West Kootenay Power Company from Barrington Falls, 35 miles away. The station at the 800-ft. level is nearly completed, and the mine is making regular shipments.

Homestake.—The 5-ft. ledge of shipping values has gained in importance with further development. The main tunnel is now in past the point where the shaft will cut it, and will be continued about 200 ft. further to drain the upper workings, at present filled with water.

LeRoi.—All the new machinery, costing nearly $400,000, is in place except the second hoist at the head works of the 5-compartment main shaft. This will be in working order this month. The main shaft is down nearly 1,000 ft. and the stopes have been cleaned of all stored ore. The annual report of the manager showed that the whole cost of mining, including breaking, hoisting, development, depreciation, insurance and management, was $3.25, freight and treatment $4.50. The average value of ore treated was $13. The conveyance of the ¼ interest of Messrs. Breen and Bellinger in the smelter at Northport has just been filed. The consideration stated is $300,000, and the transaction leaves the LeRoi Smelting Company the sole owners of the plant.

LeRoi No. 2.—Shipments are made daily from the 400 and 500-ft. levels of the No. 1, and from the Poorman Shaft on the Josie.

War Eagle.—The repairs to the shipping tramway are finished. About 700 tons a week are sent out. There are 5 lawsuits pending over the hoist and electrical machinery supplied the mine two years ago. The War Eagle Company is suing the James Cooper Manufacturing Company, the West Kootenay Power Company and the General Electrical Company for heavy damages for non-performance of contract, while the Cooper Company and the General Electric have each cross suits against the War Eagle Company pending for machinery and work performed. The amount involved is very large. It is stated that an attempted settlement of all the differences is in progress. Should the sale of the Trail Smelter go through, and the Gooderham people obtain the plant, a great change should take place. An expert from New York is now at the smelter and will report to the Gooderham syndicate direct. The manager has announced that no details of mine development or in fact any information will be given to the public.

Vancouver Island.

The Nanaimo Miners' Union recently elected the following officers: President, William Stoker; vice-president, James Bradley; secretary and agent, Ralph Smith; assistant secretary, Neil McCuish; treasurer, William Smith; auditors, J. C. Waters and George Johnston; executive committee, Richard Booth, Moses Woodburn, William MacAllen, John Aitken, George Johnson, William Neave, S. Woodcock and W. Parkin; delegates to the trades and labor council, J. C. Waters and W. Jones.

Britannia Copper Company.—Messrs. H. C. Walters and L. Boscowitz have been in London, Eng., completing the sale of this company's property on Howe Sound to Messrs. Bewicke & Moreing. The purchase price is reported to be $727,500, of which $5,000 was paid February 19th and the balance is to be paid on May 17th.

Goldsmith.—Moreing & Bewick, of London, Eng., recently secured a bond on these copper properties on Howe Sound, 30 miles from Vancouver, which include all the copper claims, from the Britannia mines, on the mountain, right to the water's edge. The option is for 60 days. The sum mentioned is $375,000 cash and 25% in the stock of a new company.

NEW BRUNSWICK.

Westmoreland County.

Dorchester Mining Company.—This company, with headquarters at Providence, R. I., has $2,500,000 capital stock, divided into 250,000 shares. It owns about 125 acres of land in fee and has under lease about 540 acres. The company is installing machinery at the old copper mine 2 miles from Dorchester. Shaft No. 1 is down about 90 ft. It is drained by an 800-ft. tunnel. Shaft No. 2 is about 350 ft. west of shaft No. 1 and shaft No. 3 is west of No. 2 and connected with it by a 400-ft. drift. A. W. Chapman is local manager.

The buildings for the crusher and the smelter are completed and most of the machinery is in place.

Intercolonial Copper Company, Limited.—During the past year about 50 miners, etc., have been employed at the works. Already probably over $100,000 has been expended in these works by the company. According to expert estimates it ought not to cost over 90c. per ton to deliver the copper ore to the rock breaker. The cost of a chemical extraction process, so far as chemicals are concerned, is slight, since there is an absence of lime and other basic material in this sandstone which would waste acid.

NOVA SCOTIA.

Intercolonial Coal Company.—The annual meeting took place March 7th at the office of the company in Montreal. The sales of coal and coke for the year ended December 31st, 1900, amounted to 225,869 tons. The following gentlemen were elected directors for the ensuing year: Messrs. James P. Cleghorn, W. M. Ramsey, Thomas Wilson, E. Goff Penny, A. W. Hooper, R. MacD. Paterson, Charles Fergie and F. C. Henshaw. At a subsequent meeting of the board, Mr. James P. Cleghorn was re-elected president; Mr. Charles Fergie was re-elected vice-president and general manager; and Mr. D. Forges Angus was re-appointed secretary-treasurer.

Cape Breton.

Dominion Coal Company.—It is stated that the

company estimates its payment of wages this winter at $600,000 or 4 times as much as the usual amount. Mention of a few of the improvements being made will give some idea of the class of machinery in use. At Caledonia Mine, which has been in operation nearly 50 years, a new fan is being installed by the Dickson Company, of Scranton, Pa. It is 14 ft. diameter and estimated to give 250,000 cu. ft. of air per minute. At the Reserve Mine a Chandler fan which was imported a few years ago is giving 204,000 cu. ft. of air per minute, with a water-gauge of .75 in.; if run up to full speed this fan would give 300,000 cu. ft. The company is installing 5 air-compresors, mainly to operate coal-cutting machines. The largest is one built by Messrs. Walker Brothers, of Wigan, and erected at Dominion No. 4. It has high-pressure steam cylinder 31 in., low-pressure 51 in., high-pressure air 32 in., low-pressure air 51 in., by 5 ft. stroke giving capacity of 6,400 ft. of free air per minute at 80 lb. pressure and 45 ft. piston speed. The total weight of this compressor is 132 tons, the flywheel weighs 25 tons, the crank shaft is 16½ in. diameter and the crank pin 9½ in. diameter. It may be interesting to note that the same company has in operation the model air-compressor built by the Canadian Rand Drill Company for the World's Fair at Chicago in 1893.

The hoisting engines for Dominion No. 2 have been set up according to the specification. They are guaranteed to raise 4,000 tons in 10 hours from a depth of 950 ft., each lift to consist of 6 tons. The cylinders are 34 by 48 in. The drums are conical and grooved to the rope, ranging from 9 to 14 ft. diameter. The rope is 1⅝ in. diameter and is being supplied by Messrs. W. B. Brown & Company, of Liverpool, Eng., who during the last 6 years have supplied the Dominion Coal Company with more than 100 miles of wire cable.

North American Coal Company.—Hiram M. Pearl and S. K. Hamilton, of Boston, who 20 years ago were directors of the Terminal City Enterprise on the Strait of Canso, are seeking incorporation for this coal company with a capital of $1,000,000. The coal areas are at Caribou Cove. They were operated 30 years ago by a company that allowed the leases to lapse.

ONTARIO.

Petroleum Oil Trust, Limited.—This London, Eng., company claims to be absorbing all the Canadian Petroleum Company, the Irish Proprietary Company and the Belgian Company in the Gaspe District, taking over their capital and plant and giving them stock in the Petroleum Trust, Limited.

Hastings County.

Atlas Arsenic Company.—This company is not making arsenic, but intends to erect in the spring a Brown horseshoe furnace, manufactured by Fraser & Chalmers, of Chicago. Negotiations have also been in progress for a cyanide plant, the intention being to use the same process which the Canadian Gold Fields Company has found successful with mispickel ores. The company has now a 10-drill air compressor and is working 5 drills. It has been operating for a year a 10-stamp mill erected on the tract known as the Five Acres and has had success in treating the mispickel ores by amalgamation. The company is also working a mispickel property known as the Atlas Mine near Malone, about 6 miles north of Deloro. The vein is said to average 5 ft. wide and yields nearly 20% in pyrites. Assays of a number of samples gave about $8 a ton in gold.

Belmont.—This gold mine 8 miles northwest of Marmora is worked by the Cordova Exploration Company, of which D. G. Kerr is manager. The company owns a water power at Deer Lake, 2½ miles from the mine, where 2 dams have been built. The large dam is 80 ft. long, 12 ft. high, 13 ft. thick at base and 6 ft. at top. It is built of concrete and masonry. The other dam has a timber slide 20 ft. wide for lumbermen and also a sluice gate to admit water to the flume. It is contemplated to instal a large air compressor and through a 10-in. pipe supply power for the whole mine.

The new mill is 175 ft. long, 90 ft. wide and 85 ft. high. The 30 stamps are driven by a 150-H. P. Corliss engine. The engine and shaft are strong enough to extend the mill and drive 120 stamps if necessary. Each 10 stamps can be hung up completely without slowing the engine. Crushers are two, one 10 by 20 and smaller one 7 by 10. The mill has ore bin capacity of 600 tons. The crushed ore on leaving the mortar boxes flows over plates 36 ft. long having a series of 10 drops. From there it passes over 6 Willfley tables driven by a separate engine which has a capacity for double that number.

Below this floor is the new cyanide plant. It consists of 3 large steel leeching vats, 15 ft. in diameter and 4 ft. deep. Below these are 2 steel gold tanks, 7 by 2 ft. and further below are zinc boxes where the gold is precipitated by zinc shavings. Below these are two sump tanks 9 by 4 ft., and also 3 wooden acid tanks on this floor. Above the leeching vats are 2 other steel tanks 10 by 5 used for storage. This is the first cyanide plant ever used in this district, Deloro using bromo-cyanide. The plant is in charge of W. H. Whytock, who spent 5 years in the Rosedeep Mine in South Africa. The stamps and tanks were manufactured by the Wm. Hamilton Company, of Peterborough.

The engine and boiler house is 80 by 40 ft. The old mill engine is used for driving the dynamos for electric lighting. The boiler house contains 2 horizontal tubular boilers, with space for a third. There are the usual feed pumps, with National feed heater to heat water by exhaust steam.

Electric current for lighting is generated by 2 dynamos having 600 light capacity with 250 lights now installed. There are abundant lights throughout the mine, shafts, mills, shops, office, manager's residence, store, boarding house for the staff, etc., and a large arc light over No. 1 shaft.

Behind the mill is a large tank house 112 by 20 by 20. It contains 7 large water tanks 15 ft. in diameter, 12 ft. deep, with capacity of 75,000 gals. The water supply comes from No. 1 shaft.

The assay office now consists of a brick building in two parts 20 by 38 and 20 by 20 ft. The larger part contains a sample grinding room, where will be installed a motor, sample grinder, stone breaker, underneath the floor of which is a 20 by 20 cellar for coke, and a furnace room 20 by 18, equipped with combined gasoline furnace and muffle. The other part consists of a laboratory, 20 by 20, an office 10 by 10 and a balance room. The building is heated by furnace.

The air compressor plant is a frame building 140 by 60 ft. and containing a cross-compound compressor with intercooler and after cooler and condenser of 185 H. P., with air receivers and air line from air receiver to the various shafts. High pressure steam cylinder carries 125 lbs., low pressure steam cylinder 25 lbs., high pressure air cylinder 85 lbs., low pressure air cylinder 20 lbs. It has 2 return tubular boilers in separate rooms with electric damper regulators and water tank, 7,000 gals. capacity, for coolers.

Deloro.—This gold mine in Marmora Township is equipped with modern mining and gold milling machinery, including a 20-stamp amalgamation mill, concentrating plant and bromo-cyanide leaching plant to extract gold from the concentrates.

White arsenic of excellent quality is being produced as a by-product, averaging 40 tons per month from the concentrates. The supply of ore in sight reported to be satisfactory. The company employs 125 men under P. Kirkgaarde, superintendent.

Stewart.—This property, of Madoc, near Queensboro, is now called the Sophia Mine and is owned by Mr. Peter McLaren, of Perth. It has a 10-stamp mill, having been erected last summer. The ore is free milling of low grade, with occasional rich shoots. The mine is said to be paying very well.

Lake of the Woods District.

A collection of ores from this region for the Pan-American Exposition will be made by Mr. Carter, of the Bureau of Mines, and Mr. Preston, of Mine Center. They are already at work.

(From Our Special Correspondent.)

Sundla-Lindell.—The shaft being sunk on this property north of Black Sturgeon Lake, by the St. Paul parties who have an option is down about 40 ft.

Stella.—At this mine the shaft is down to the 150-ft. mark, 25 ft. of this being new work. At this depth the vein is about 14 ft. wide. On the foot wall is a layer of quartz from 4 to 5 ft. thick, the remainder of the vein consisting of crushed country rock with strings of quartz and quantities of sulphides, chiefly iron. An improved hoisting apparatus is to be put in shortly.

Rainy Lake District.

Golden Horn.—This property on Rush Bay, near the Mikado, has been taken over by the Golden Horn Mining Company, a Montreal and St. John concern. The claim shows a large dike containing several quartz veins. A shaft is down 75 ft. The sum of $10,000 has been set apart for development.

MINING STOCKS.

(From Our Special Correspondent.)

Full quotations of the Toronto and Montreal Exchanges will be found on pages 379 and 380.

Mar. 22.

We are experiencing a quiet season in the mining stock market, as few happenings of note are reported at the various properties which could influence speculation.

War Eagle, of Rossland, has been depressed by disappointment in the annual report. The supporters of this stock nevertheless express hope of better things in the future as the company has already paid in dividends $545,250, which is equal to 31 per cent. on the issued capital stock. Hope is centered in the lower level of the mine, where pay ore is expected.

Payne, in the Slocan District, was pressed for sale and is lower in price, as some holders believe dividends will be stopped. Up to January 15th, 1901, the company disbursed a total of $1,438,000, of which $338,000 was paid by the present organization. In the year 1900 the consolidated company paid $234,000, or 9 per cent. on its issued capital stock of $2,600,000.

Old Ironsides, Knob Hill, and Granby Smelter, in the Miner-Graves consolidation, are very firm, and few sales are being made even at the advancing prices, as holders anticipate a prosperous future.

Dardanelles is to be reorganized on March 23d with a capital stock of $1,500,000, divided into 10c. shares. Work is to be continued on the property under the assessment plan, and in exchanging the old for the new stockholders will be called upon to pay a 5c. assessment in instalments of 1c. each. Much money has already been spent in developing the property, and when work is resumed stockholders expect better results.

Republic, of Washington, has been active, though at a lower range of prices. The company has a number of contracts with mines in its vicinity to treat their ores at a reasonable price. Certainly the Republic Power and Cyaniding Company shares will appreciate in value when the results at the mill prove as satisfactory as is anticipated through the management of the present able superintendent.

Center Star, of Rossland, was weak, notwithstanding the declaration of another monthly dividend of 1c. per share, making the total to March 1st, 1901, $140,000, which is equal to 4% on the capital stock of $3,500,000.

Crow's Nest Coal has received much outside attention, and officers of the company have been busy denying various wild rumors concerning the property and its owners. Vice-president Jaffray is reported to have denied that President Hill, of the Great Northern Railway Company, had bought the property, but he admitted that Mr. Hill had taken 30% of the company's stock "for a private investment."

It is also stated that the Crow's Nest Pass Coal Company is controlled by Canadians, and that its property is not for sale. At the annual meeting of the company on March 1st, President Cox made an interesting speech, which will be found in another column, with the financial statement of the company for the year 1900. Sales of the stock have been moderate at lower prices than a month ago.

There is still much said about our smelting industries, and recently the Northport No. 5 plant blew in. The starting up of this fifth smelter does not materially increase the capacity of the whole plant, as smelter No. 4 had to blow out for repairs. The Fernie proposition meets with universal favor, though it will be some time yet before the smelter will be built.

The American evaporated salt combination—the National Salt Company—has listed its shares on the Montreal Exchange. This company gives its total capital stock at $12,000,000; its net earnings in the year 1900 were $1,302,729, and its surplus during the 12 months was increased to $715,748. Large dividends have been paid on both the common and preferred shares, as will be seen by reference to the dividend table published in the "Engineering and Mining Journal." Dealings in National Salt shares were moderate; the common brought $40@$41, and the preferred $73¾@$75. Simultaneously with the listing of these shares on the Montreal Exchange, Canadians interested in our salt industry planned a consolidation of their own. This is called the Canadian Salt Company, with a $800,000 share capital, which will control all the salt mines in the Dominion. One American from Buffalo, N. Y., is interested, the other promoters being Montreal and Toronto gentlemen.

The wire has been hot with contradictions of a deal between the Dominion Iron and Steel Company, of Sydney, C. B., and the Morgan syndicate, which promoted the gigantic American consolidation, known as the United States Steel Corporation. "We have not sold nor thought of selling the property," say the officials of the Dominion Iron and Steel Company. Since then the company has secured subscriptions to $3,000,000 worth of its 7% cumulative preferred stock at $85 and accrued dividend; the issue has been advertised in both American and Canadian newspapers. At the same time the United States Steel Corporation has been publishing advertisements in Canadian papers, similar to those appearing in the American press, asking stockholders in the constituent companies to deposit their shares in the combination. It is hard to tell how many Canadians are holders of your industrials, though I do not doubt our people speculate in these stocks.

The cost of a seat on the Montreal Stock Exchange has been advanced by the payment of $12,000 recently.

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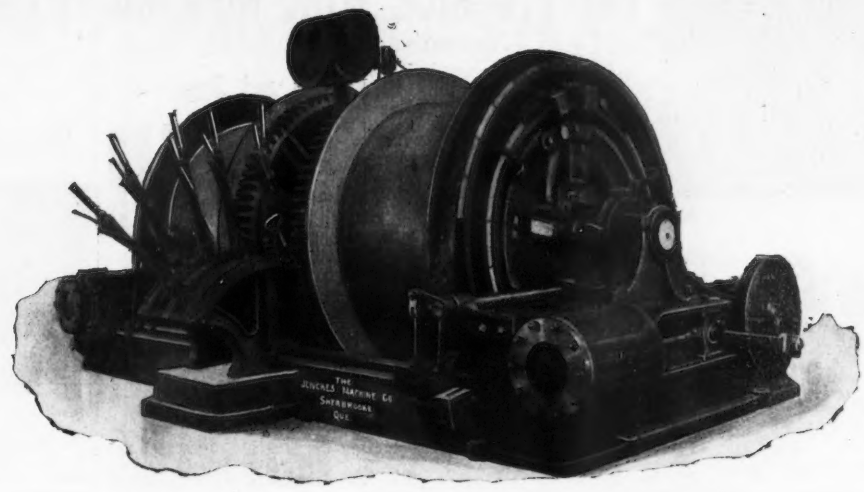

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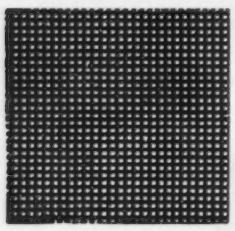

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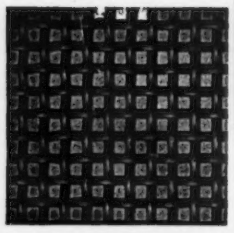

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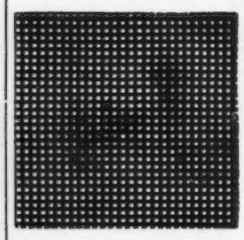

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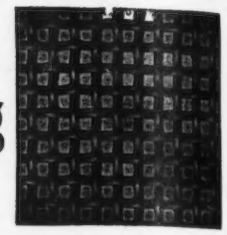

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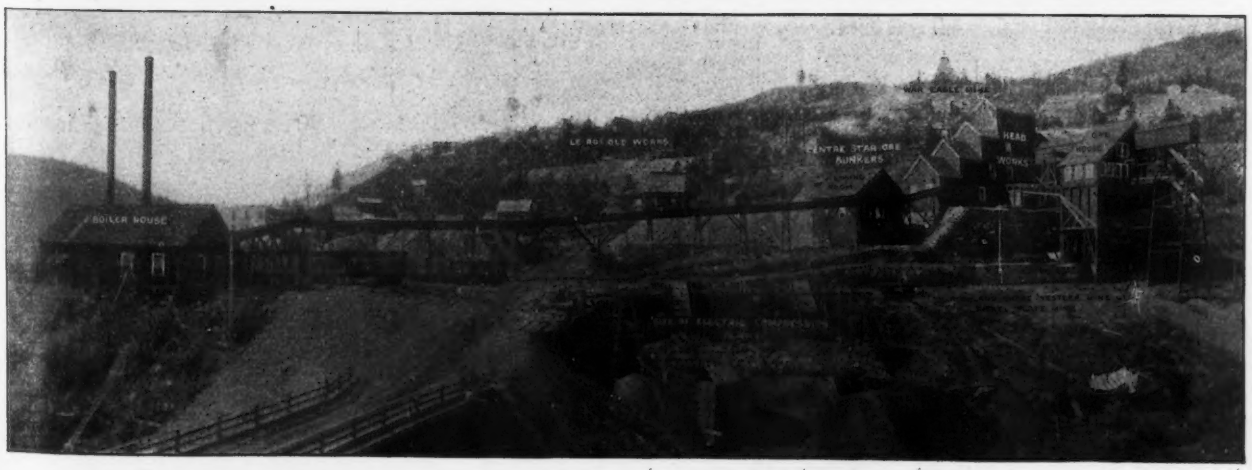

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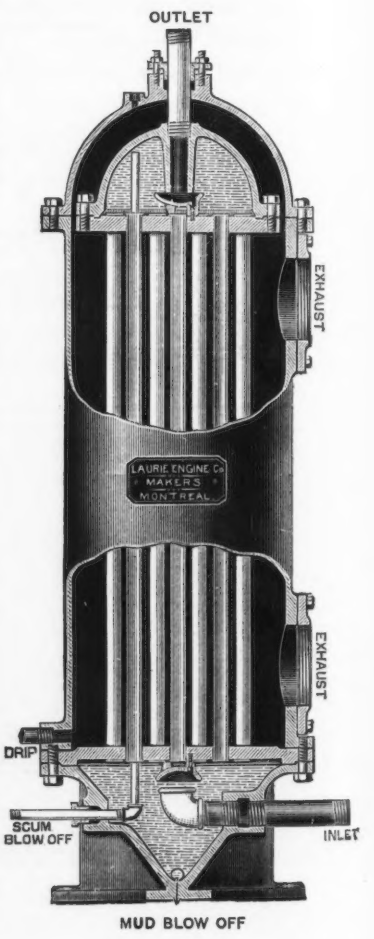

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